

AVIATION WEEK

A MCGRAW-HILL PUBLICATION

NOV. 30, 1953

50 CENTS



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RESEARCH KEYS

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GENERAL ELECTRIC

Domestic

U. S. air power now totals approximately 97,579 aircraft annual, of which 38,936 are military and 52,643 commercial, reports James H. Smith, Jr., Assistant Secretary of the Navy for Air.

Aircraft makers prove an annual payroll totaling more than \$3.2 billion a year and make up the second largest working force in the country, according to Aircraft Industries Assn.

Civil aircraft shipments totaled 379 complete planes valued at \$21 million during September, an increase of nine airplanes and \$5 million over August, Civil Aeronautics Administration and Bureau of Census report. The aircrafts boosted total value of shipments during the first nine months of 1953 to \$162.4 million. Civil aircraft engines added up to 465 units at a total horsepower of 415,000, a 24% drop in number but a 10% increase in power. Total value of engines \$7.2 million.

Highplane production reported 64 aircraft valued at \$496,666 last month, increasing the total for the first 10 months of 1953 to 788 units at \$3,745,276, according to Aircraft Industries Assn. Companies reporting: Beech, Cessna, Piper and Taylorcraft.

Donald B. Johnson, executive director of Aircraft Transport Assn., a new president of non-scheduled airline organization. New ACTA board of directors: Otto Moynihan, Midwest Air Transport; John G. Thomson, Jr., Argonaut Airways Corp.; Sheld H. Cook, Starline Airways; Gay Collins, General Airways; Robert D. Jones, U. S. General Airways; and Roy C. Bates, Western Transport.

Stearns Air Company's 22nd Beech Wing at B-17 medium jet bombers took off on a \$5000 sale flight to England from March AFH, Calif., but was to replace the 362d, scheduled for reassignment to its home station at March AFH, Pa.

Volney C. Fink, 61, jet propulsion scientist and mechanical engineering professor at Stanford University, died this month in Palo Alto, Calif.

New assignment of the aviation gas contract at New York's Idlewild International Airport goes operation of the fuel facilities to Allied Aviation Fueling of New York, Inc.



Tail Chute Brakes Super Sabre Landing Run

New North American YF-100A Super Sabre jets its tail parachute to slow its ground run. Tail chute is particularly valuable for emergency landings after burst on approach into small fields. First production model of the Super Sabre came off NAA's line Oct. 20. The airplane, USAF powered by a PW8A, 107 sq-ft wing area, is the 16,000-lb.-class fighter being an all-weather.

Aviation recommended site at New York's Idlewild Roosevelt Field last week was offered to the air industry by Webb & Knapp, Inc. The study company put a bid. I decline on the offer, first made three years ago.

a 15-cent dividend on capital stock, payable Dec. 11 to stockholders of record Nov. 10.

International

Atomic aircraft engine will be developed from a small British bomb capable of producing a "miniature" explosion, Britain's plane manufacturers predict. They expect the bomb to lead the way in solving the problem of getting nuclear reactor units small and light enough to fit into aircraft.

British aircraft exports amounted to \$107.2 million during the first nine months of 1953, an increase of approximately \$14 million, Ministry of British Aircraft Construction reports.

De Havilland Aircraft of Canada is taking over maintenance and overhaul of General Electric J47 jet engines used in B-47A and B-47B bombers. The company will move into a special \$250,000 plant built by the government and used until now by Canadian General Electric for J47 work.

Rafael Arnes, president of LAV Venezuela Airlines was killed this month in a former airplane explosion caused with embarking company funds.

Appropriations for military aviation in July will total \$135 million during fiscal 1953-54, estimates now before Parliament reveal.

DH Comet service has been inaugurated between Paris and Johannesburg, South Africa, by Union Aeronautique de Transport on a 17hr., three-stop schedule—connected with 20-hr., nonstop service offered by BOAC Comet flights.



Engine Driven G-E Energizer, 1000/500/1000-wpp (above) and Frequency Converter Energizer, 4000/500 (below)



Heavy type DC-6 Energizer manufactured by G-E Electric and Aircraft, Inc., Tulsa, Pa., and equipped with G-E AC and DC generators and exciter (below)



Another SCHWEIZER PRODUCTION ASSIST*



The Grumman SZF-1 is the first carrier aircraft combining the elements of submarine search and attack in one airplane. It is the Navy's most modern way of hunting out enemy submarines.

SCHWEIZER is proud of its part in assisting with the production of this deadly sub-killer... another example of versatile engineering and manufacturing in addition to making the internationally famous SCHWEIZER sailplanes.

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*Other SCHWEIZER Production Assists for Bell, Fairchild, Kaman, Link, Republic, Staley, etc.



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SKYRAY CAPTURED—Douglas NF-104 Skyray is hoisted over the rim of the USS Good Sea by catapult's explosive charge during carrier qualification trials off Norfolk, Va. Note streamlined stress container on tailwing ribs. (Cover story story p. 18.)

700-Mph. Skyray Tests Its Sea Wings



ON THE ELEVENTH—Wings kinked for experiment, the 700-mph. Skyray proves on the Good Sea's deck during a landing test. It is not carrying its bomb-like weapons. The single-seat fighter made approximately 30 landings and catapult takeoffs during its carrier tests.



TAKEOFF—Skyray's low-approach wings are highlighted in view of lighter wing structure. Eleventh on the Good Sea's deck.



Tape helps Bendix "can" small aircraft parts



Polyken Tape No. 214 with the film on "canned" aircraft parts at drive timing tables. Even the largest case can be sealed in approximately eight seconds.

Field mechanics at U. S. Navy and Air Force bases used to receive small repair parts packed together in cardboard cartons. This method did not provide perfect protection during shipping and left the stored parts exposed to damaging moisture and dirt after the cartons were opened.

Bendix solved this problem by "canning" the parts in special tin containers—and sealing the lids with reliable Polyken Tape No. 214.

This Polyken Tape provides a strong, waterproof seal that conforms to government specifications JAN-P-127, Type 1 Grade B. And because Polyken Tape No. 214 has excellent adhesion and tack, the same piece of tape that makes the original seal can be used again by merely pressing it back around the lid.

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WHO'S WHERE

In the Front Office

Mr. Gen. Arthur Thomas, retired command of Air Materiel Command's Eastern Air Powering District, is now vice president of Machine & Tool Designing Co., Philadelphia.

Dale A. Liddy, vice president and engineering for Alpha-Air, Inc., has been elected to the board of the National Civil Aircraft Association. L. E. King has been appointed general manager in charge of business growth and development.

Lyons Kinn has become vice president of National Co., electronic firm at Middle and Malone, Mass.

Edward G. Linn, former legal representative for Flightline Equipment & Airplane Corp.'s Aircraft Division, is now assistant to the president of Vista Corp. of America, New York.

Changes

Charles C. Bussell has been appointed executive engineer for Continental Aviation & Engineering Corp.'s West Coast operations at Burbank, Calif., Calif.

John J. Farrell has been named general manager of General Electric's new heavy military electronic equipment division at Syracuse, N. Y., and **Herman J. Kozig** is general manager of the light military electronic equipment department, Utica, N. Y.

John N. Jacobs has become procurement director for Pacific Helicopter Corp., Memphis, Tenn. **Oliver Glasgow**, David M. News, executive director of aircraft maintenance, Charles F. Hornet, manager of aircraft maintenance, and **Lyons Kinn**, manager of aircraft maintenance.

Robert E. Hender has been promoted to director of administrative services for Aerospace Corp., Jackson, Mich. **Harold E. Ferguson** is new production director.

Nate H. Lee has been appointed chief manufacturing manager at Lycoming Aircraft Corp., Farmingdale, N. Y.

George E. McKee, former chief of staff of Civil Aeronautics Administration's New York International Office, has joined Lockheed Aircraft Service as service manager.

Honors & Elections

Ralph S. Denson, president of Texas World Airlines, has received the American Legion's Award of Merit for his contributions to aviation.

Raymond C. Blacklock, assistant chief engineer for Chance Vought Division of United Aircraft Corp., has been elected by the University of Michigan for "outstanding achievement and contribution to the development of engineering." **D. G. Anderson** and **John Bunker**, assistant project engineers at C.V., have been elected chairman and secretary for the Texas section of the Institute of the Aeronautical Sciences.

W. D. Patten, manager of aviation sales for Phillips Petroleum Co., is vice chairman of the American Technical Society Council of the American Petroleum Institute's Division of Marketing.

INDUSTRY OBSERVER

North American Aviation, Inc., and Douglas Aircraft plan to continue their rivalry for speed records, pitting the A1D two-seat bomber and the P-108 supersonic fighter in a battle for a new transcontinental speed record. P-108 is a better plane but will have to stop for refueling on the transcontinental route. A1D can make the trip in one day. Present record for single seater jet is 4 hr. 13 min. set in 1946 by Col. W. H. Casseloff in a Lockheed P-80. There is no official transcontinental record for multi-seat military aircraft, although an 1899 Boeing B-17 flew nonstop from Miami AFB, Fla., to Andrews AFB, Md., a distance of 2,239 mi. in 3 hr. 46 min.

Positions for weapons manufacturers in reducing the missile component segment in aircraft added missiles in the S-44. One American manufacturer, the new S-44 supporting missile and supply vehicles for field operations, making it even more cumbersome logistically than the Army's S-44 missile, missile carriers.

First Vickers Viscount from the firm's new production line at Barn, England, is due to fly soon. It will be the 21st Viscount model produced by Vickers. Viscount still a growing threat competition for the Conquest 140 in the international urban market.

Lockheed, Indianapolis, Ind., is interested in establishing a domestic helicopter passenger service in Indiana. It is considering operating of Sikorsky S-55 helicopters on these experience with these single-engine helicopters.

Weight differences between General Electric J47 and Rolls-Royce K.A. 7 have proved a design problem in determining the balance between the engine and the aircraft. Now powerplant had to be moved all to correct CG location. Displacement had to be shortened correspondingly.

English Electric's design for a DC-3 replacement—one of several aircraft proposals in the British industry—calls for a De Havilland Dovesby powerplant. If Air Registration Board decides that this qualifies the design as a two-engine craft, the firm will proceed with the design.

USAF has made an official announcement on the cause of the crash of the Bell X-1 research plane at Edwards AFB, Oct. 13, but indicated uncertainty on the accident that killed test pilot Maj. Raymond D. Taylor was the result of a spin at about 12,000 ft., from which the plane never recovered. Despite repeated radio pleas from his chase pilot to bail out, Taylor said the plane to the ground. The X-1 was used for testing variable angles of sweepback on wings.

American and British designers are looking to the gas generator (compressor and combustion) section of a gas turbine as a powerplant for helicopter, conversions and some types of fixed-wing aircraft. For helicopters, the half gas would be used to drive rotor tips. For conversions, the gas would drive a remote turbine geared to a propeller. For conversions, a gas box would drive the power required from rotor to propeller. Present Sikorsky has a helicopter project and a DC-3 replacement designed around the gas generator and F4U-1A engine. U.S. designers also are experimenting with this principle.

A turbo-propeller aircraft "of advanced design" is being designed by W.E.W. Patten at Farnborough in England. Patten, who designed the English Electric Canberra, currently also supervising construction of the Genet, Patten's lightweight fighter expected to fly late next summer.

Commercial version of Sikorsky's new, twin-engine helicopter, the S-46, will have accommodations for 15 passengers and a crew of two, according to United Aircraft Corp. This is under short-term conditions and makes allowance for 15 lb. of baggage per passenger.

Aircraft industry is producing 13 out of 14 aircraft though military production accounts for 95% of the industry's activities.

President's Decision

Fiscal decisions on the first 1984 budget will be made personally by the President. Members of National Security Council will present their views at fiscal sessions early in December. Decisions will not be by consensual vote, however. They will be made personally by the President—possibly even against majority advice of NSC.

This year there was confusion on the President's position on defense cuts, particularly a \$5 billion reduction in Air Force levels. It related later from the President on the eve of House consideration explicitly supporting reductions in the House proposed defense budget in general credit for defense moves to status cuts.

Next year there will be Presidential support for the defense budget from the outset.

Foreign Military Aid

Money for foreign military aid probably will be included in the defense budget next year, instead of being submitted in a separate item. It is felt that it will be less susceptible to congressional challenge under a "defense" category than under a "foreign aid" listing.

\$2-Billion Air Defense?

An Administration request for a \$900 million supplemental appropriation to raise a major continental defense program offering will touch off a fight in Congress. Rep. John McCreath, House Democratic Whip, will lead a group to attempt to cut \$2 billion.

Single R & D Fund?

Assistant Secretary of Defense Donald Quisenberry says that "the existing means of the three agencies in research and development must be maintained" and that "there must be a large degree of decentralization." However, among the question of one overall Defense Department appropriation for research and development, he says:

"There is no single overall research and development appropriation for the Defense Department as a whole. Within the total of the various appropriations, we have separate funding for the three services, and we have to consider, even when subsequent changes in appropriations might make such transfer desirable. Our system of budgeting, appropriating, obligating, and then performing is not as flexible as good R & D administration would call for."

White on McNeil

Assistant USAF Secretary H. Lee White is not at step with Air Force proponents who want to Deke McGovern's Congressional. White to one who has long been used to seeing Air Force programs and that year succeeded in securing a \$5-billion shift in USAF money to the new Administration.

White volunteered to a congressional committee "Secretary McNeil, because of his length of service engaged with his ability, has been capable of doing an outstanding job and building around himself an excellent organization."

Critics point out that White, as well as McNeil, is a Naval Reserve officer.

Guided Missile Ships

Introduction of guided missiles into the fleet will not put a new ship construction problem for the Navy. Chief of Naval Operations, Adm. Robert Cooney, said no requirement for new ship types for missile launching. "We don't need to build a special guided missile ship. We have a lot of good, rugged hulls around the battle-ship, battle cruiser, and some heavy cruisers which can be converted to missile launching."

Murray Controversy

Undersecretary of Commerce for Transportation Robert Murray will be a controversial figure in the next congressional session. Substantial opposition, including Rep. problems, to his new policies in Civil Aeronautics Administration activities is evident. There must be a vote to reauthorize CAA in an independent authority, but the chance of enactment of such legislation seems to be virtually nil. Hearings would give some members an opportunity to express their disaffection. Murray's actions to cut back CAA activities, though, undoubtedly will be supported strongly by House appropriations committee, long critics of the agency.

Feders Miss Opportunity?

Local service airlines seem to be overlooking one possible for winning political support. Senate Small Business Committee. Small law representatives have criticized the group possibly for changing the members' position in "small business" and upgrading small local problems. The committee's staff director, Lawrence Henderson, reports the committee considers the local level "generally small business"—but that the law has never placed their own problems before the committee.

Local service airlines say it is true they have never asked on the Small Business Committee for help. In fact they requested before the committee two years ago asking if that Civil Aeronautics Board was doing a good job in helping small business, having set up and funded growth of the 17 airline local service industry. Many views of the local area is that the Administration's economic program may not be their solution.

CAA Jobs

Senate Post Office and Civil Service Committee headed by Sen. Frank Lautenberg, are looking at investigation to determine whether Civil Service Commission is keeping jobs under Civil Service classification that should be policy appointments. Target of some Republicans is the commissioners Republican chairman, Philip Young.

He held a wide range of key posts in the Roosevelt Administration and has worked closely with the Democratic member, Frederick Louder. Republican member George Murkin has been the minority. Because of rapid cuts laid down by CSC, Commerce Department asked the removal of only two CAA jobs from Civil Service for policy appointments. It was a targeted list. The task, information disclosure and information network.

—Katharine Johnson

AVIATION WEEK

Douglas Skyrocket Reaches Mach 2.01

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- NACA test pilot Crossfield pushes research aircraft close to peak performance despite severe turbulence.
- Record flight encounters control problems, described as aggravated versions of those in transonic zone.

By Robert E. Holt

Los Angeles—Scott Crossfield, 37-year-old test pilot for the National Advisory Committee for Aeronautics, became the first man to fly twice the speed of sound (Mach 2) when he piloted the Douglas Skyrocket 1,327 mph at an altitude of 65,000 ft over the Mojave Desert.

The Skyrocket's special performance was the climax of a joint program of research into supersonic flight started by NACA, Air Force and Navy two years ago. The record-breaking flight came as a little more than six years after the program produced the first piloted flight to exceed Mach 1 by Maj. Charles Yeager in the Bell X-1.

• **Severe Turbulence**—Crossfield made his second run shortly after noon Nov. 21 in the face of what he called "severe turbulence from a passing cold front and drastic rattling from a hot cold and stormy wave." Accompanied at the Mach 2 flight by test pilot 24 he said NACA engineers "checked and checked data gathered by the highly automated research plane."

"The Skyrocket was carried state by a strong B-28 weather plane which took over the lead from the B-35," he said. B-28 aircraft to launching altitude after the takeoff from the speed runway at Edwards AFB where NACA conducts its highest flight research. After earlier runs from the B-35 at 72,000 ft, Crossfield used two of the four Republic Motors' rocket tubes for a 30-day climb, stopping at 49,400.

On reaching the desired altitude, Crossfield quickly mounted a Zero C-100 pushover propellers to a maximum speed run with all four rocket tubes putting out momentum 6,000 lb thrust.

The speed run was made in a full flow dive with the temperature about -67°F. Crossfield told American Wings he saw the Mach meter register over Mach 1 for five to ten seconds with a maximum reading of Mach 2.01.

• **Control Problems**—Crossfield reported problems associated with radio height Skyrocket flights were common

lead by Crossfield, but he declined to reveal further details. NACA scientists indicated that the problems of exposure control were similar to those encountered in the transonic zone but aggravated by higher speeds.

Flight was the first made by Crossfield in the Skyrocket and came only a few weeks after he set a new unofficial speed record of 1,273 mph (Mach 1.96) in the same plane. The second flight was at 40,000 ft, carefully planned and precisely executed attempt to push the frontier of piloted flight to Mach 2. It required exact adherence to a prearranged flight path (including strict control factors in fuel, altitude and power) to produce the maximum result.

Crossfield flew one of the three Skyrockets built by the B-28. The first of December while his subject and jet had failed previously to provide additional thrust and liquid oxygen tank for rocket motor.

• **Three Losses of Fuel**—This Skyrocket lost 300 lb of fuel in the first three minutes of endurance at half power. Total flight time from the B-28 drop to the landing on Rogers Dry Lake bed was 12 minutes with eight minutes in the climb before the fuel supply was exhausted. There was only four minutes of powered flight available for the speed run.

NACA scientists told American Wings that Crossfield had noticed the Skyrocket very close to the limit of its performance and that much higher speeds cannot be reached in the future. However, continued Skyrocket supersonic flights will add much valuable new data.

The Skyrocket has made about 700 flights with Douglas, military and NACA pilots since 1945.

The military research institute has received 5,000 scientific reports of the Skyrocket flight testing for use in designing supersonic combat planes. An indication of how close recent combat planes are pushing the limits of so much research is apparent in the Convair F-101 all-weather interceptor which is designed for a performance of Mach 2. F-101 has made its first test flight



SKYROCKET REACHED 7200 ft. Scott Crossfield (right), NACA pilot who flew the Douglas D-558B to a new speed mark (1,327 mph) Nov. 21, with two other Skyrocket crew members Douglas test pilot Bill Rodgers (left), who set a previous speed record of 1,273 mph, May 4, 1950, and Major Corps Lt. Col. Milton Carl, who set the Skyrocket altitude mark of 65,000 ft last Aug. 31.

and already is scheduled for production. "Typical example of the combination scientist pilots at the NACA highest flight research station who have contributed so much to the knowledge of supersonic flight. He has a master's degree in Aeronautical Engineering from the University of Washington, and was a Navy pilot during World War II. He worked as a wind-tunnel engineer and chief engineer at the University of Washington's new lab. There he did work on a number of high-speed fighter designs, and the Boeing B-47 Strategic Bomber."

He has been with NACA since 1950 and has flown a variety of jet fighters, such as bombers and fighters. In the highest research program, he has flown the defense wing XP-54, Northrop X-4, Bell X-1 and X-5 and the Douglas Skyrocket.

He also is the author of several scientific reports on high-speed flight. At least 40 men during a dozen of the flights attached to the flight, Crossfield said. "I guess maybe I should mention that figure to include every man and

occurs at the NACA highspeed light research station they all had a part in the conception and execution of my research flight."

► **Engineers' Deliberate**—The Skyrocket was designed by the Douglas Aircraft Co. Douglas B-1 Supersonic Division, headed by Ed Heinemann. It was financed by the Navy as part of the joint research program conceived in 1945 by NACA, Air Force and Navy and organized in 1946.

Contracts for the research phase were let in 1945. The program has paid enormous dividends in the production of highspeed jet bombers, and the subsequent Section 100 fighters built by North American, McDonnell and Convair for the USAF and Navy fighters built by Douglas, McDonnell and Wright.

The Skyrocket contract was let after VJ day in the summer of 1945 and the mockup appeared in March 1946. The first plane was finished in November 1947, 20 months after the contract was let. The first flight was made Feb. 4, 1948, and the actual success performance of the Skyrocket doubled the original Navy spec regarding Mach 3. Heinemann pointed out that the Skyrocket's wing design is a conventional subsonic type with rounded leading edges and no notches, and not the supersonic knowledge type. Wing and tail sections are highly NACA streamlines with the fuselage skin made of magnesium.

It carries 625 lb. of specially designed armaments.

► **Industry Impressed**—Almost industry was impressed with the combination of the Douglas design and the plane's skill that produced Mach 3 in actual flight—much faster plane, especially built to go only half that fast.

The supersonic research program is scheduled to be augmented soon with two more planes capable of Mach 3 or better performance. They are the Bell X-2, which is built of titanium steel with a winging design and powered by a 12,000-lb thrust Corbin-Wright rocket engine, and a new version of the Bell X-1 with turbo-jets replacing the rocket-powered fuel system at the subsonic velocities that make the first six percent flight. New plans double the rocket fuel capacity of the X-1 which is aimed at a maximum speed of 1,700 mph.

Titanium Bearings Start Second Round

Expansion of titanium production is a major problem facing defense planners (Aeronautics Week Oct. 26, p. 16).

As aviation output doubled since the World War II peak of 1.1 million pounds a year in 1945, the production of 177,180 tons of titanium annually—or 20% of the total aviation weight—would be desirable at the time. In addition, manufacturers estimate that 33% of engine weight should be in titanium.

This year, production is expected to be less than 1,300 tons.

Recent developments:
► **Several** firms not now engaged in titanium production—including Thiess Aluminum Co., Korte Aluminum Co., Missouri Chemical Co., Electric-Met Co., Electro-Titanium Corp.—have developed improved processes for metal production.

National Academy of Science now is conducting one of three Government financing of additional capacity barges on the outside.

So far, the government has contracted for an increase of only 15,000 tons a year out of the reinforced steel base of 32,000 tons.

► **Commerce Department's** Bureau of Defense Services Administration and Office of Defense Mobilization are launching a drive to obtain titanium scrap for reprocessing.

An estimated 40% of titanium production ends up in scrap at aircraft manufacturers' plants and much of that is going to waste because of uncertainty with scrap metal. Government wants manufacturers to take scrap back to titanium mills directly, instead of selling it to dealers.

► **An interdepartmental committee** to coordinate experimental research on titanium is being organized under Assistant Secretary of Defense for Research and Development Donald Quade.

The three services and National Academy of Sciences will be represented. Industry may be asked to participate at a later date.

► **Senate's Strategic Metal Subcommittee**, headed by Sen. George Malone, last week drafted a national stockpile of titanium in Washington to boost the requirement for titanium and steps being taken to increase output.

When defense stimulus to the production is prolonged, according to the Medical and Pharmacy critical information, Bureau of New York, which announced the drug for its American distribution, Pfizer Laboratories of Brooklyn sponsored the single dose, 24-hr. protection, where other similar drugs require more frequent administration.

Called **Benemine**, the drug was developed by Dr. Raymond B. Bann and is being used by Sirena, Belgium Air Lines, the business operator. Tests have been made by U. S. Air Force, Army and Navy doctors and the Belgium Air Force.

Disposers and other side effects are said to be slight.



HOURS ARE PAID FOR transcontinental flight schedules by AA's New Douglas DC-7.

DC-7 Speeds Up AA Schedules

American Airlines began doing better than its transcontinental schedules this week with the inauguration of nonstop DC-7 service between New York and Los Angeles. American will operate one nonstop jet daily on its "Mainway" schedule until Dec. 16, when the second nonstop schedule will be added.

DC-7 schedules will be 7 hr. 15 min. for the eastbound flight, and 7 hr. 55 min. for the westbound trip. As a result of the Civil Aeronautics Administration's certification tests plus previous transcontinental morning flights made last week with full passenger loads, there is little doubt among industry observers that the new Douglas transport can make these schedules with ease.

Two previous flights logged eastbound crossings of 6 hr. 15 min. and 6 hr. 12 min., the latter setting a new official transcontinental record for a transport with full load. Average speed of the former flight over the 2,474-mi. Great Circle course between Los Angeles and New York was 380 mph.

Speed is the primary selling point of the DC-7. American plans to use this speed by offering the fastest transcontinental schedule not only between New York and Los Angeles, but also among Boston, Philadelphia, Washington, Chicago and Dallas.

► **25 mi. Galien-Vie** rather than 25 DC-7s to make in both the east and west coast stage services. With delivery of an additional stage transport scheduled in January plus the long-range DC-7s, AA will be throwing the advantage of speed into the highly competitive transcontinental rivalry by 1949.

► **American Airlines** is now said to be using the talk of other transports as the "in." AA chief executive Don Reed told Aeronautics Week: "With the DC-7, our transcontinental service will be from 20 to 25 mph. faster than our closest competition. The DC-7 is the most com-

mercial transport in history from the viewpoint of the airline, with a horsepower of 33% less fuel factor on the medium-range plane and an even lower price on empty service."

► **Increased Speed**—There are prospects of increasing the current 365-1/2-hour crossing time of the DC-7 to the next figure.

AA now gets 3,250 hp. from each of the Wright R3350 Turbo Compound engines on takeoff and 1,800 hp. cruising. AA plans to increase the bleed to 3,500 hp. and the cruising horsepower to 4,500.

American DC-7s use the improved version of the Turbo Compound, with heavy protective shielding around the turbine wheels. Little recent thought has been reported. The four Turbo Compound of the DC-7s have 2,400 lb. of 115 octane fuel per hr.

Route Record

National Airlines' new Douglas DC-7 set an official transcontinental speed record for transports on its assigned flight New 21, crossing the U. S. from Santa Monica, Calif., to Miami, Fla., in 5 hr. 10 min. 12 sec.

The NA's flight, timed by National Aeronautics Assn., clipped about 14 min. off the previous commercial record, made of 6 hr. 24 min. set by an Eastern Air Lines Commodore on Nov. 10.

Cap. L. J. Russell reports the DC-7 reached maximum speeds of 450 mph.

The new National transport is scheduled to go into service on the New York-Miami route Dec. 15.

► **Improved Operation**—Observers on previous flights noted the following points of the DC-7's operation:

► **Cabin comfort** is enjoyed over the DC-6. Noise level is about the same despite the increase of 1,400 hp. during the cruising flight and 3,000 hp. during takeoff. Four blade Hamilton Standard propellers with slower tip speed help to cut the noise.

► **Douglas** loaded the fuselage in the place of the propellers by doubling the quantity of steel fuselage rings, using heavier skin and extra forward wing structure. Excessively, the DC-7 is much quieter than other types. Turbine blades smooth out exhaust engine heat and exhaust noise. Props also are quiet.

► **Cabin seats** are made of conductive, particularly the special form rubber used in the seats which support heat properly when doing. Cabin pressurization on maximum 8,000-ft. conditions, while cruising at 15,000 ft. Normal DC-7 flight pressure will be cruising at 20-25,000-ft. altitudes.

► **Power in conditioning** works well and is particularly noticeable on the ground when outside temperatures are too hot.

► **Indemnification** Problem—American faces a passenger indemnification problem on the spectacle of Turbo Compound exhaust during night flights and low-level cruising during poor weather landing runs.

Turbo Compound have extremely short exhaust stacks to avoid backing up back pressure that would result in increased exhaust velocities. As a result, a thick black smoke extends a yard behind the exhaust port into the leading edge wing. It causes drag during the climb and no problem during the cruise.

Galien officials are being limited to cabin passengers regarding "Volant" (Volant). During poor reversal, engines turn briefly in reverse direction and the turbine rotates, discharging pressure in the forward vents. Air portions of the engine casing, steps of the leading edge and top wing area behind nacelles are made of titanium, providing better heat resistance and saving 200 lb. weight per nacelle. Turbo exhaust is an extra problem.

Other technical points:
► **The main landing gear** is strengthened for use as speed brakes—similar to the device on jet fighters.

► **Cockpit** equipped of jet engines drops the main gear by gravity and the air stream holds it in place.

► **Noise shield** is lowered later by a hydraulic gear control that also locks the main gear for landing.

► **Main gear** can be extended at an inclined speed of 160 mph. Flies on the previous flight were placed with the aerodynamic break to facilitate controls that eliminate the booster system and save considerable weight.



Fairchild Jet Transport Design

Airline's conception of the Fairchild J-1500 44-passenger transport design shows recently to representatives of 21 U. S. airlines (Aeronautics Week Nov. 23, p. 28). Major features of the J-1500 is its "cruiser" wing, stated to be a delta modified by adding slight swept extensions. The result is a planform

closely resembling the British "stratojet" wing configuration. J-1500 is planned around a pair of heated Wright J67 turbo-prop engines with a maximum thrust rating of 12,000 lb. each, which would provide a takeoff 37000-cruiser speed at an altitude of 40,000 ft.



MG-15 BEFORE TAKEOFF shows characteristic dual-engine layout, broken by bulges for guns and ejection chairs. Fine protruding line wing between fuselage and dorsal of cockpit are visual load-bearing indicators. At left of windbreak is slotted panel.



MG-15 ARMAMENTS pack lowered from fuselage on two cables for access. Fuselage on ground cover exposed heavily. Large cannon (7 mm) mounts recoil spring and takes take externally. Fuel tank not probably a steel, protects against puncture.

Red MiG-15:

By David A. Anderson

First detailed pictures of the \$100,000 MiG, only Russian-built jet aircraft to come into U. S. hands in symbolic condition, have been released by Air Force.

A team of five top USAF test pilots evaluated the Red intercepter against the North American F-86 Sabre in a series of flight tests which covered the range from cloud to field flights to simulated combat. Results of the tests still are being studied, but here are the first pilot reports:

- The Sabre was pummeled over the MiG in a combat weapon.
- Lack of maneuverability on the MiG kept the pilot busy and diverted his attention from short flying.
- The MiG is slower in lift-out level flight.
- Stall warning is insufficient in the MiG.
- The MiG cockpit is uncomfortable and on the small side.
- Heating and ventilating system are poor.

• **MiG History:** This particular fighter had been built in 1951 and was the same model used in combat in Korea. On Kumsak, senior lieutenant, North Korea was downed, flew the Russian-built craft to Kumsak Air Base on Sept. 21, the following day the intercepting intercepter was on its way to



MG-15886 was wide open to short splitters for landing light. Gun camera mounts over rear rotor, and panel for access lies on ground under left wingtip. View shows inclined drop of swept wings, critical fuselage construction.

AF Test Pilots Analyze Captive Fighter

Classroom in the belly of a C-124

After reasonably the Okinawa, the MiG-15 was ground tested, it made its first short, low-altitude flight Sept. 25. The first test pilots who put the little Red plane through the gauntlet included Maj. Gen. Albert Boyd, commander of Wright Air Development Center, Maj. Charles Yeager, first pilot to fly faster than sound, and Capt. Dan Old E. Collins, recent holder of the 15,000 mph speed record (F-500, 70° plus mph).

• **Miscellaneous:** The photographs show the excellent finish of the MiG, built in a conventional manner. There apparently are no large areas of riveted skin, for example. Large numbers of rivet lines cross the fuselage and tail surfaces, showing that the structure underneath is composed of many light frames and stringers. Only four major bulkheads are indicated by the rivet pattern.

MiGs which fought in Korea were equipped with a top speed of about Mach 0.91. The engines produced about 12,500 lb. without after-burners. Engine was a Russian development of the Rolls-Royce Nepean rated at under 7,600 lb. thrust with water injection. Russian designation of the engine is VK-1.

Wingspan of the sweptback craft is 35 ft., overall length is about 37 ft.



MG-15 TAIL has large blisters at junction of horizontal and vertical surfaces to protect fire breakaway. Elevator has external skin doubler near aftward hinge. Top rudder hinges are external, lower are hidden. Duct panel is good look.

F4D Trials

- Pilot describes Skyray tests aboard Coral Sea.
- Navy's fastest jet passes check in rough weather.

El Segundo, Calif.—Qualification of the Douglas F4D Skyray aboard the aircraft carrier *Coral Sea* was a "routine" operation for the Navy's fastest jet fighter, but carrier-based pilots to hold the world's speed record, Lt. Grade James E. Vanden reports (plan see p. 9).

Verdin, who flew the Skyway to its second 755.8 mph. (Aviation Week, Oct. 12, p. 36), was one of two Navy planes who put the X-45-1 through its paces during carrier qualification tests Oct. 26-30 in the Atlantic off Norfolk, Va. The other was Cmdr. Marshall Beebe, director of the Flight Test Division of the Navy's Patuxent River, Md., test center.

"The weather was windy with intermittent squalls," Vondra said. "The deck was pitching considerably but this gave a good check on the airplane's capability for cross conditions."

► **Long-term Stability**—In an interview with *Architectural Record*, he described the Slaves' career collaboration in detail.

Among tests conducted were sea-
-saw speed trials off the catapult and
for landing approach. The Navy record-
-holder said the F4D was "compatible
-with other carrier aircraft" in this
-respect.

"It handled at least as well all the cargo as any other jet and better than some," Veselin said. "It is a very

The F4D's Westinghouse J46 engine without afterburner performed "very well" during the carrier trials, the Navy pilot said. "Outside of a little bit of fuel control trouble, which was only a matter of adjustment, its performance was excellent."

• **No Backlash-Tests** were conducted to determine the most practical growth speed for the Skyrise and to test the assumed characteristics at various speeds. Deck handling characteristics under varying wind conditions, ease of output lowering, hoisting all and on the same elements were checked.

"It was late in all respects as far as I could tell, although the report undoubtedly will show some things have to be changed," Verda stated. "They were able to get the plane around the deck without trouble. There were no problems in getting on the catapult. It was right on every base."

► **Typical Tests**—Approximately 90 landings and catapult takeoffs were made with F4D aboard the *Coral Sea*.

After the plane is hooked up aboard the catapult, you go over the checklist list. When ready to go, you give the catapult officer the thumbs-up sign. He looks up two flags to indicate that he is ready. You run up the power, check your instruments, put your head back on the seat and give him a salute. Then you're land. It's quite a job."

The explosive charge blew the F4D out of its ground slot with sufficient force to bring it up to flight speed in a distance of approximately 50 ft.

▶ **STOPS** Landing after putting the Sixty through full increasing high-performance aerobics to bring it down to landing weight in a hurry, the hot pilot made his landing approach.

"You come down the starboard side, drop which, drop both, go over your checklist list and turn downward. You judge your altitude by getting the stack of the carrier on the horizon. You get ahead of the day, turn into it. By then your speed is within a few knots of where you want it for landing."

"About 45 deg from the ship, you can see the signal officer. Coming in, you mustn't hit signals then when he gives you the cut, you pull the throttle and land."

The high-speed T4D loads slow enough to stop on the spec of 150 ft on the corner dock with no assist from the strapping wires, Veeber said.

Aircraft Firms Fight New California Tax

Aircraft industry and the Defense Department are planning court tests of the legality of a 6% personal property tax which four California counties have imposed on manufacturers in their respective counties.

Following the lead of Los Angeles County, San Diego, Alameda and Riverside County assessors have taken the unusual constructive hit in transfer personal property equal to the difference between the total value of the inventory (principally machine tools, parts and material) plus work in process (such as in stock on the line) and the program payments received (Avenues West Oct. 19, p. 12).

Formerly the courts took that position of a manufacturer's liability contract was not paid by the guarantee under the proper payment plan as a account payable or solvent credit at a rate of 6% of 1/30.

► **First Attempt**—Los Angeles County is the first to attempt this type of tax in the U.S. It stands to gain about \$12 million a year from the new tax.

Such an interest in the tax on government contract would be deductible from the total contract value. The

would cut down the number of aircraft, in the case of aircraft manufacturing, which could be produced under a contract.

Government attorneys have been working on the problem since Los Angeles County Board of Equalization denied in August the petition of 50 county aircraft manufacturers to reduce the tax. Included were major aircraft firms such as Douglas Aircraft, Cessna, Fieseler, Lockheed, Northrop, North American and Hughes, in addition to smaller engine and subcontractors.

The board denied all petitions after month-long hearings.

► **Committee Organized**—A steering committee has been organized by Defense Department's general counsel, Hal Steve Hassel, and the group has had one two-day meeting at the Pentagon to determine how to attack the measure. Airline industry and Atomic Energy Commission representatives were present.

The committee now awaits additional information from the contractor involved and advice from the Justice Department before it makes the next move. Test cases will be selected eventually by the committee and court action probably will begin in Los Angeles County Superior Court or federal court.

It remains, the government plans to take its fight to the U. S. Supreme Court. The method of attack probably will be decided before Dec. 10, the date on which the new tax becomes delinquent for manufacturers on Los Angeles County's second tax roll.

► **Chewman Named**—Chairman of the

strongly criticized a Jack L. Straggle, assistant general counsel, reply on his own. Straggle said he was not an attorney, but a lawyer, for the Defense Department. Other members appointed by counsel Hensel and the three active secretaries, Merritt H. Singer, assistant general counsel for Navy Cadets; Walter J. Fringsdorf, Navy Judge Advocate General's office; and Gerritt W. Winfield, assistant general counsel for procurement, USAF. Col. Robert H. Hanzon, USAF judge advocate General's office; Roy G. Glade Jr., USAF judge advocate General's office; Michael W. and Lt. Col. Russell N. Forbush, both of the Army Judge Advocate General's office.

The steering committee takes the stand that the tax is not only illegal, but unconstitutional since it is a tax on government property. Bills have come up before Congress in the past proposing various taxes on government property but none has passed.

◆ Douglas Wins Case—During World War II, the Los Angeles County Superior Court tried such a personal property tax in order to obtain water funds to run the county. Douglas Aircraft won.

the case to court and received a favorable decision from the Intermediate Court of Appeals.



1



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PRESIDENT Al Uelsch, Flight Safety founder and veteran transport pilot with a million-mile safety record as business pilot...

Business Flying

Refresher Pilot Training Pays Off in Safety

By Frank Soto, Jr.

A private concern in flight safety, in the face of a scheduled training program for business pilots, is proving off big dividends as higher operating standards for corporate aircraft flying.

Sponsor of the program is Flight Safety, Inc., operating out of the former international terminal at New York's LaGuardia Airport. Recently opened Flight Safety, Inc., has to be conducted with complete Flight Safety Foundation, Inc. hosts one of the finest groups of electronic pilot training equipment in the business,

a Curtiss-Wright DeHaven automatic radio range. One five U. S. airlines possess comparable equipment.

With the DeHaven and a hand-picked staff of instructors, the organization is able to offer comprehensive courses that have gained the confidence of more than 500 pilots from some 47 business firms who have attended classes.

► **Top-notch Pilots**—Al Uelsch, veteran transport pilot who has also ruled up a million miles of safe flying as a business pilot, is president of the or-

ganization. Uelsch is executive pilot for the president of a major U. S. air carrier.

"Business pilots are top notch," says Uelsch. "A look at the safety record proves it." The figures speak for themselves.

"But there follows work to sustain top notch. This means maintaining their proficiency and keeping up to date on latest operational procedures."

"Active pilots are required to fly to take periodic refresher training. Business pilots should at least be given the



DISERTED F-86F ASSEMBLY LINE at North American Aviation, Inglewood, Calif., after strike started Oct. 25.

Picture Study of North American Strike



SUPERVISORY PERSONNEL look on. This is electrical and radio station.



ENGINEERING DEPARTMENT on the job during the strike, typical of 15,000 professional/technical employees who remained in the plant after 30,000 workers went out.



ONLY A TENSICLE of workers, compared to customary heavy traffic, goes out the gates at 4:30 shift change under eyes of orderly pickets that controlled plant.



SUPPLIES COME THROUGH with-out interference but you workloads.



FEDERAL MEDIATOR John P. Foster tries to keep negotiations going smoothly.



UNION AND NORTH AMERICAN NEGOTIATORS wrap arguments at second Marmon Hotel in Santa Monica. Union asked 35 cent-an-hour wage increase.



NEGOTIATOR for striking UAW-CIO workers at NAA talks privately at North American representative girls in a point.



NEGOTIATOR for North American looks sorry as talks drag on. Scale of 35,000 added three plants in California and Ohio.



Can you see the BIG difference?

On the face of it, Avion's Two-Unit Fuel Gauge looks like previous systems, but there's a big and important difference behind it all.

Behind this Avion fuel gauge (shown here three times actual size) is Avion's brand-new concept of fuel gauge system "packaging."

Previously, you'd find these units behind a dial; an indicator case, motor and balancing potentiometer; and elsewhere a bridge-amplifier, a shockmount and a tank unit.

Now, in the Avion Two-Unit Gauge, the necessary components for the bridge and amplifier functions have been built right into the indicator case.

The result: a fuel gauge system of "plug-in, plug-out" simplicity, which weighs 50% less and eliminates the need for any field calibration.

What a BIG difference this makes in money!

Part of it, the basic system costs less. Less time is spent in installation. Less wiring and connectors are needed. Less maintenance is required, because there are fewer components to maintain. Trouble-shooting time is cut for the same reason. And, fewer parts must be stocked for maintenance collections.

Because of this new package, Avion gauges are now "shock-free." They're completely unobscured in the aircraft for which they are designed.

Additional functions for fuel management can be easily integrated into the basic Two-Unit system.

The Avion Two-Unit Fuel Gauge is now available to meet your production programs. The indicator is available in either large or small sizes, with all varieties of dial configurations.

Every month, Avion produces over two thousand major instrument components for the aviation industry.

The Avion Two-Unit Fuel Gauge will make such a BIG difference in your cost sheet, we suggest that you write or call for more information today.



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NAL Asks No Subsidy For Copter Operation

National Airlines has asked Civil Aeronautics Board for immediate permission to start nonstandard helicopter operations in Florida, then to pass protected certificate hearings.

National, with one Sikorski S-55 and plans for two more, is the first airline to go into nonstandard copter operation (AVIATION WEEK Oct. 16, p. 91).

NAL asks it wants a temporary CAB exemption to prove that the public will respond to the service in sufficient numbers to make it a success.

Such authority would be similar to CAB's experimental aircraft permits and blanket exemptions in air freight operations in 1967, National says.

The carrier proposes to try a charter rate of \$2 per plane-mile.

The south Florida area that National proposes to serve is "an ideal area for the conduct of an experimental operation of that type," NAL says in its application. The airline cites:

- Ideal weather.
- Terms of many laws, which in some cases make copter transportation more desirable because neither transport is dangerous.
- Vacation market of "unspoiled values."
- Routes, airport and filing transport requirements suited to short-haul, high-price copter transport.
- National is the only local service carrier operating in the area.

Improved Turboprops Boost Viscount Power

(McGraw-Hill World News)

Low-cost, improved grade seven and turbine blades of the Viscount Viscount's Rolls-Royce Dart turboprop powerplants are expected to provide the pilots with 30-50 additional horsepower at cruising conditions, increasing the transport's speed by approximately 15 mph.

A reduction in specific fuel consumption is also gained, Viscount claims. The new engines are rated at 1,510 hp, or below.

All new Viscounts in order will have the modified powerplants and earlier planes will be fitted with these engines. The additional power eventually will permit operating the Viscount at 50,000 lb. gross takeoff weight compared with the present limit of 55,000 lb.

Cruise performance figures for the Viscounts with the updated Darts (cruise performance shown in parentheses): 591 mph at 15,000 ft (594), 529 mph at 20,000 ft (531) and 515 mph at 25,000 ft (524).

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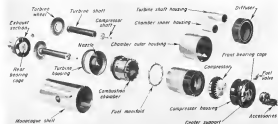
Fairchild Stresses Simplicity in J44 Jet



ONE APPLICATION of Fairchild J44 is in Ryan's Fireball target drone shown just after release from Douglas B-26 another plane over New Mexico desert.



J44 CUTAWAY reveals engine's major components assembled by fast rearing monocoque shell. Details of these parts are detailed in the exploded view below.



• Engine's original design was for expendability, but its features would lend it to long-life uses as well.

By Irving Slocum

The 1,000-horsepower Fairchild J44 is the first U. S. turbojet engine designed from the start for expendability—a jet engine to power target drones and one-shot missiles.

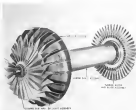
Reduced to a dependable base structural minimum for the job it must do as a relatively "throw-away" engine, the J44 emphasizes simplicity and non-repairing economy. For example:

- A single monocoque case carries the engine load.
 - Comparatively few assemblies are involved in the engine's making.
 - Mated parts are held in a snap action.
 - Fuel nozzles are of the bone oil-actuator type, cost only about \$3 cents each.
- The engine is an ingenious piece of work from design conception to its execution on the production floor. And although designed to be expendable, results achieved indicate that the J44's features are equally applicable to "long-life" jet for piloted vehicles, it is reported. Engine life stands has been

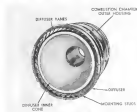
'Compact, Rugged and Highly Producible...'



COMPRESSOR HOUSING has bearing caps, mount for the accessories, and integral oil tank ahead of the compressor case.



TURBINE is bolted to turbine wheel by large-diameter hollow shaft which has a helical connection at flange ends.



DIFFUSER is one-piece magnesium casting containing 30 vanes. Case is riveted to combustion chamber main housing.



COMBUSTION CHAMBER, viewed from rear, clearly shows vane configuration. These carry 12 megawatt units.

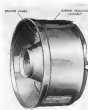
appreciably extended from the original goal because of test work, it is said.

► **Long in Minutes**—Although initially designed by its creator, the Engine Division of Fairchild Engine and Airplane Corp., as a powerplant for Ryan Aero Systems Corp.'s Fireball target drone, the J44 now stands service long before the Fireball was reported. The engine has been a jet engine for U. S. ground missiles that have been fired since 1950.

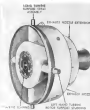
In the Fireball application, where the drone has been recovered by parachute, the recovered engine (Model J44-R-12) has been used repeatedly in flight schools.

A larger thrust version of the J44 is now being developed for other specific missile and target drone applications, Avionics Week has learned.

► **Fresh Approach**—Design of the J44 was laid down in 1947. A rigid military requirement of size, weight and thrust



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controlled cooling of the powerplant.
The engine was fitted for special
bleed-down and bleed-up applications at
a time when demercury rates were
expected to be low. For this reason, the
engine was put through only a 12-lb
qualification test. This amount of
"bleed-in" time was considered neces-
sary merely to protect personnel during
ground ramp and vehicle handling
operations.

Even though the engine was tested
and a shakedown, Darnell's en-
gines started from scratch with an
open mind for a fresh approach to meet
the various requirements, rather than
cobbling some existing design for down-
grading, downgrade and underdrive.
The result was a compact, rugged high-
performance design.

► **PreSection Making**—The J44 con-
verts five main sections—accession,
compressor, combustion, turbine, and
the exhaust section.

Completely assembled, the engine
weighs 501 lb. dry, minus some equip-
ment. Its overall length is only 71.7
in., its diameter is 22 in.

It is a variable-mounted, multi-
turn, screw-in, the turbine has a
clutch on the compressor housing flange.
The engine also can be adapted for
5-point mounting, with no brackets
penetrating inside the engine's struc-
ture. Center of gravity of the engine
is on the midline of the engine cowling
about 23 inches aft of the mounting
flange.

► **Accession**—The accessory section is
minimally as used on the central gun-
ner (front bearing support) of the
compressor intake housing's forward
end. It is secured to the housing with
eight bolts, and is easily removable by
one man for replacement as it will
allow any of its components require
service.

The accession section consists of a
five-point housing, adjustable access
isolating air flow, bleed-down, gun-
motor, fuel pump, fuel filter, gas control,
ignition coil, and gas control control
valves.

► **Mixed-Flow Compressor**—The com-
pressor is a mixed-flow type. It is a
centrifugal compressor and which takes in
and discharges the air radially. It also
enables the production discharge of the
accession intake and turbine blades.



COOLING air and gas flow paths through
J44 is delineated in this external view of
engine. Centrifugal compressor's air intake
and discharge inlets and fan.



TURBINE SYSTEM is simple arrangement.
Oil turbine is integral with compressor
bearing. Pressuring air is fed from
compressor discharge.

mounted in the axial-flow type of com-
pressor. Compressor pressure ratio is
1.7 to 1 at rated speed.

Actually, the supplier is a three-point
assembly—front, intermediate and rear
sections—joined at the hub by steel
rings. The internal splines of the front
compressor sections are aligned on main-
shaft for engagement with the splines on
the compressor turbine shaft.

The load which would be imposed
in pressure plus centrifugal forces was
considered to be too much for a one-
piece cast compressor. Hence, the front
compressor section (pressure) is a cast-
aluminum casting, while the intermediate
and rear compressor sections are machined
from magnesium forgings. To the
latest production model (H44B 20), the
compressor will be a two-piece configura-
tion—one casting plus one forging.

► **Bearing, Housing—Forward** end of
the compressor compressor shaft is coupled
directly (by internal splines) to the
accession shaft for rotating the gas
direct. All end of the compressor shaft
is designed for holding to the design



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CAVITY-LOCK MOUNTING feature of J44 would permit attachment to rear end of
vehicle, as shown, without any additional air support on the engine intake.

How Fairchild Assembles the J44 Jet Engine . . .



1 Exhaust section is first major component in the jet driving exhaust air around



2 Turbine wheel with large diameter shaft fits into new housing with slide shaft



3 Turbine housing enabling cool inside assembly is slipped over turbine shaft



4 Diffuser with combustion chamber water housing critical to it is assembled



5 Impeller fits over extension shaft also used to drive power jet accessories



6 Compressor housing covers impeller and starts to stack on diffuser flange



7 Compressor shaft slips over engine body after assembly has been completed



8 Section of housing is attached by eight bolts to center portion of compressor housing for completion of non-removable job. Center housing also contains front bearing



9 Section of housing is attached by eight bolts to center portion of compressor housing for completion of non-removable job. Center housing also contains front bearing

J44 Characteristics

• Thrust, lb	3,000
• Engine Speed, rpm	15,700
• Pressure Ratio	2.94
• Weight, lb, dry (gas fuel flow indicator pressure alternator, electrical cable and terminal, and power control valve and linkage)	305
• Diameter in. (base)	22
• Length in. (with accessories)	79.7
• Frontal Area, sq ft	4.84
• Specific Weight lb/cu ft (dry)	8.3
• Thrust/Unit Frontal Area, lb/sq ft	376

end of the large diameter compressor-turbine shaft.

This arrangement allows a small front-bearing to be carried on the compressor shaft, instead of on the much larger turbine shaft. The small-diameter bearing, involving less thrust load than the ball, is subjected to lower centrifugal loads, hence has greater capacity to withstand gyroscopic loads of the engine.

The same step-down shafting arrangement aft of the turbine gives the same small-bearing benefits. Both front and rear bearings may be removed and replaced without disassembly of the engine.

Supported by four radial struts, the center portion of the compressor intake housing not only serves as a mounting base for the accessory section, but acts as a cage for the front bearing, as well. Front half of the compressor housing is cut hollow to serve as a rear vent for the engine oil supply.

• Diffuser Flare Case—The diffuser is a one-piece cast-aluminum casting consisting of an outer shell and an inner shell with 18 vanes between. Front flange of the diffuser has studs for attachment to the rear flange of the compressor intake housing.

The compressed air flows through the diffuser vanes and the velocity is decreased, with a boost in static pressure just before entering the combustion chamber.

In the new production model, the diffuser inner shell may have the vanes not integral with it, but welded to it and wrapped with a shell of sheet metal.

The stainless steel combustion chamber is made of a monobloc. This configuration was selected because it is cheaper to build than incorporating a lot of cast, it is lighter, simpler to maintain. One bearing of the combustion chamber is moved to the rear of the diffuser's outer shell (shown), so that the two together make a single assembly.

The combustion chamber rear bearing and the turbine shaft bearing are moved to the rear of the diffuser inner case, forcing accessory passages through which cooling air passes to insulate the com-

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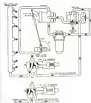
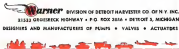
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FUEL AND CONTROL system details in 344 are illustrated in this diagram.

bottom chamber from the remainder of the engine.

The combustion chamber extends an ascending passage placed around the outer wall for attaching and tying with rollers to the chamber's outer housing.

► **Chamber Flow**—The greater portion of the air from the diffuser enters the chamber through two smaller passages. One of these is formed by the inner wall of the combustion chamber and its outer housing. The second passage is formed by the outer wall of the combustion chamber and its outer housing.

As though these passages enter the combustion chamber through a series of openings at the inner and outer walls, ports with the largest resulting from fuel burning is the primary one and leaves the compressor to a valve suitable for entering the turbine section.

► **Nozzle Data**—Spaced around the combustion chamber done are 11 holes to surround the fuel chamber. These nozzle-to-oxidizer units carried on a manifold are similar to the burner in burner-type, but have a larger opening. They are rated at 18 gph by each nozzle with about 500, 1000 and 1500 cfm.

Chairs are run on the nozzles to get a group of 12 with the same relative size characteristics. The relative pressure is very low, but is considerable because of the compressor results and

► **Turbine Area**—The turbine housing assembly consists of an axially fixed welded to a turbine main. The nozzle is a one-piece casting with static vanes and vanes already integral. Front end of the nozzle main divided supports the turbine shaft housing, while the turbine housing supports the rest of the combustion chamber housing.

The turbine disk has 46 high-tensile-profile cast blades welded to its periphery. Space between the blade root web is used as a passage for cool-



ELECTRICAL wiring diagram indicates circuits for 344 operation.

ing air. This cooling air reduces heat transfer from the blade to the disk and is used to the turbine shaft extension on the rim of the disk. This small shaft disk allows the use of the small vanes bearing, outside the turbine vanes.

A flanged hub on the front of the turbine disk provides for a bolted attachment to an exhaust flange on the turbine shaft. This is a departure from the conventional practice of having the turbine disk and shaft integral.

In the turbo-disk design, the turbine shaft is a large-diameter stainless steel shaft of tubing. Its large diameter gives it sufficient torsional rigidity so that only the two bearings are required.

An internal flange on the front end of the large diameter shaft connects to the compressor shaft.

The exhaust section is composed of the nozzle, a nozzle extension, the turbine rotor support assembly (the rear bearing cap) and bellows strain.

► **Measurements**—Shell-Vibration experiments indicated that the engine would have to have an enclosure. Fielded engineers measured that they might as well put this enclosure to work. This plan resulted in a strong, monocoque aluminum alloy case, sufficiently so that one man can lift four of them. This monocoque shell supports the aft end of the engine, absorbing enough rigidity to permit counter mounting at the front end of the engine.

This is the method for mounting on the F-4, and is also applicable for engine attachment to the aft end of a missile. Prop in powder motors of the Finke, where the rate of descent is about 16 feet per second; the mounting and the entire engine structure stands up.

A machined flange mounted to the forward end of the cowling covers 26 studs for attachment to the compressor in line housing. The aft end of the monocoque shell is bolted to the tapered ends of the struts extending from the rear bearing cap. In the new production model, the cowling will extend only between the compressor housing and nozzle housing.

A removable plate on the cowling gives



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seals to the angle speaking at the combustion chamber.

Turbine leads passing into the rear bearing are transferred to the bearing housing and from there to the shaft. From the shaft the lead is transmitted to the monocoque shell, which causes it to follow to the front end of the engine at the monocoque flange.

A lead on the engine mounting flange receives a dowel located at the bearing flange on the turbine. This gives a means of isolating the engine on the turbine as well as a method for preventing rotation of the engine with respect to the mount. The engine flange clamps surrounding the engine and its turbine flange not only permits rapid installation of the jet in the plane but also would allow quick removing of the engine during flight.

• Cooling Scheme—Some of the air led into the diffuser enters ports between the turbine shaft and its housing, then flows along the front face of the turbine shell, and passes into the exhaust area through the passages between the root web of the turbine blades.

Cooling air also flows between the combustion chamber housing and the engine case, passing into the turbine bearing case through one of the support struts.

This entire internal flow is meant to prevent hot exhaust gas from entering the turbine bearing case, reduce cool temperatures at its rear end and to direct lubricating oil against the turbine bearings.

Four struts mounted on the aft end of the engine casing run rear and direct it through the sheet metal strut housing to the rear bearing case. One air exits through the rear tail cone of the exhaust nozzle. When run in not available, as during ground operations, a funnel-shaped diffuser connected to the rear tail cone serves as an exhaust for drawing cooling air through the four struts and the bearing case.

In the latest production version of the J44, these four struts will be eliminated because improvements will require struts to be separate to the bearing case during ground operations.

• Lube System—The J44 uses a separate lubrication system. This eliminates wear during compression-free revs, reducing oil film on the compressor.

Compressor air does the job of a pump. Oil in the integral reservoir in the compressor intake housing is kept under pressure from the engine discharge. This pressure forces the oil through a small orifice directly ahead of the compressor bearing. Pressure also passes across the orifice to give a spray effect around the bearing.

The turbine bearing is lubricated in much the same manner. An oil line



TOOLS required for engine's assembly are basically standard only, one special tool, compressor shaft nut wrench, shown under torque wrench at top.



FOR MOUNTING the engine would use transverse (inside the shell) plus an lift support (loads being) on rear bearing frame. The diffuser from mounting an end of a nozzle, which is constant support.

connects the monocoque with one of the rear-bearing housing struts, for a pipe to carry the oil directly to the rear of the turbine bearing. Air from the rear passage blows across the end of the pipe to give a spray enveloping the bearing. The spray is then vented out the tail cone.

• Fuel System—Fuel from the fuel pump passes through a filter to the governor. Flow through the governor is actuated by a sliding valve, whose movement is controlled by flyweights actuated by the accessory drive. A differential relief valve in the governor bleed passage from the fuel pump to maintain 75 psig above engine requirements.

Fuel from the governor passes through a nipple in the accessory drive housing. The nipple is aligned with a drilled gallery in the compressor intake housing. The gallery in turn communicates with the fuel line connected to the fuel inlet of the fuel valve mounted on the compressor housing.

The fuel valve is actuated by a cam-follower-duty solenoid. When the solenoid is energized, fuel flows through the valve to the fuel manifold. When the solenoid is de-energized, the valve closes and fuel is bled into the valve and associated to the fuel pump. Another bypass in the valve permits all the fuel remaining in the fuel manifold to be drained overboard.

• Power Control—Power output of the engine is controlled by the governor,

which in turn is controlled by movement of a power-controlled lever actuator. When the actuator is energized, it moves forward through an arc and attached linkage transmits movement to the throttle lever of the governor. This lever puts a load on the governor flyweights and as a result, these are moved to the existing value.

A constant engine-rpm is maintained according to the requirements established by the technique.

• Exhaust—The electrical system includes the turbine for generator, alternator, an actuator, fuel valve solenoid, spark coil, spark plug, exhaust nozzle thermocouple, and associated wiring and connectors.

All wires are connected to a disconnect assembly for attachment to the electrical system of the aircraft.

• Building—Four basic schemes for building up the J44 in the assembly house in a simple way:

- Assembly starts with the installation of the exhaust section in a simple vertical jig.
- Base housing is installed and returned to the bearing housing.
- Turbine and shaft assembly is inserted.
- Turbine housing, containing the nozzle, is slipped over the turbine shaft.
- Diffuser and combustion section is slipped over the turbine shaft.
- Inlet is installed.
- Compressor housing and front bearing assembly are installed next. At this point, the jet is secured around points, so that the aft end of the engine is up for next step.
- Monocoque shell is slipped over the engine for housing in all end of compressor housing and struts of exhaust section. This fundamentally completes the assembly, except for the installation of the accessory section on the front bearing housing.

Assembly or disassembly of the engine requires relatively few tools. The only special tool required is a compressor shaft nut wrench.

Stanley Plans New Aircraft Factory

Stanley Aviation Corp., Buffalo, N. Y., is preparing an industrial site near Elmore for construction of a \$700,000 plant to house a substantial part of the company's present operations.

President Robert M. Stanley says the new Elmore plant will be ready to begin operations next spring. Bulk of the company's production activity eventually will be transferred from Buffalo to Elmore. There will be about 300 firm employees at the Buffalo plant, which now employs 510 workers.

Stanley's engineering and research and development departments will remain in Buffalo.

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Side view of Westinghouse J44 turbojet and front view of J40 turbojet, showing the singular Westinghouse feature of small diameter and reduced frontal area.

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Recent studies indicate that the world's largest bellows, built by Sola Aircraft Co. for NACA's new supersonic wind tunnel at the Lewis Flight Propulsion Laboratory, Cleveland.

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Because of the bellows' large size they must be shipped from Sola's plant in San Diego to Cleveland by a specially planned water route through the Panama Canal to New York, and thence up the Hudson River to Lake Erie and Cleveland.

Cincinnati Advances Engineer Schooling

Unusually large response to a program of part-time graduate courses for practicing technicians conducted by the University of Cincinnati has forced closing of some classes at midwinter enrollment, and the formation of additional sections.

The program was developed as a joint effort by the University, a local industry committee and the engineering society as part of the nation-wide effort made by the Engineers' Council for Professional Development.

Act of the HCFD program is to con-

tribute the present and future growth of the young engineer, particularly in the first five years after his graduation.

A total of 285 engineers and scientists qualified in the same courses made available, covering the range of subjects from analytical chemistry to strength of materials.

The action in the first is a planned sequence to meet the needs of college graduates, and to enable young men to study at advanced levels while employed in the Cincinnati area.

Advanced courses in mathematics and science may be integrated with the appropriate courses in engineering to complete degree programs.

AirResearch Sponsors Air History Course

A fund for the support of research and teaching in the history of science has been established at the California Institute of Technology by the AirResearch Manufacturing Co., Los Angeles.

A three-year program will be sponsored by the fund at \$16,000 and will introduce two innovations in California's general course in the history of science, and a research project in the history of flight under professional supervision.

Director of the program will be Dr. Rodgers W. Pratt, professor of history. Dr. Thomas M. Smith, currently appointed assistant professor of the history of science, will teach the new course, conduct the study and write the history.



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Seeing For Themselves

During inspection visit of Fairchild Engine Division facilities at Farmingdale, N. Y., Lt. Col. Donald E. Pratt (second from left), Commander of the Air Research and Development Command, and Brig. Gen. Leighton Elmer "Reddy" Anderson for Development and Supporting Research (second from right),

port leaders on techniques for superprojecting jet engine turbine blades from George J. Chrysler (right), general manager of the Engine Division and vice president of Fairchild Engine and Airplane Corp. Lt. Paul Allen, Chrysler's executive assistant, looks on at left.

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Vought Erecting Own Windtunnel

Add Chance Vought to the growing list of aircraft firms which own or operate their own windtunnels.

The Dallas firm is getting about one million dollars off its own investment in this type of facility. The company's wind tunnel is used in its aircraft and guided missile programs.

Test speeds go up to about 200 mph

will be within the capacity of the new facility.

But the construction has been delayed and the tunnel should be completed next year after placing the order. The company anticipates.

Need for Unit—Chance Vought, a company with other companies, has been using a variety of test facilities

within the U. S. It will continue to make use of high-speed tunnels at United Aircraft Corp. and General Aircraft Corp. after the new unit is finished.

But, according to A. I. Skiba, Vought's assistant chief of aerodynamics, while it is the primary reason for constructing the tunnel at Dallas, the company had test requirements long gone to the point where an adequately available tunnel is essential to meet schedules.

The 200-mph figure is not to be exceeded in the jet age, either. Low-speed testing has become increasingly important. Skiba and Torrance, the aerophysicist which permits an airplane to increase its critical Mach number may make it difficult to control at low speeds and high angles of attack.

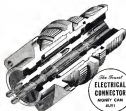
Description—The tunnel will be housed in a building about 60x150 ft. Power for driving the 20-ft fan will come from a 1,500-hp electric motor. Wind tunnel's test section dimensions are 7x10 ft.

Loads will be measured on a two-component balance system. Automatic pointing of the data will be done for permanent recording.

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Army Copter Lays Phone Line

Versatility of the copter for carrying out Army Signal Corps missions is being explored thoroughly at the Corp's Aviation Center, Ft. Monmouth, N. J. Typical of the tests being run is installation of phone and radio communications, inherently subject to delay, hazard and slow pace of conventional ground transportation.

The Army Aviation Center has used the Sikorski H-35A Army Male not only to install the lightweight aluminum telephone poles and string wire across them, as depicted on this page, but also to strung the wire and transport technicians to put the final touches on the installation.



2 Ground crew, brought to the spot by the Signal Corps H-35A, strung line to access the phone pole. Note access frame, easily convertible by helicopter



4 Flying sideways, a copter helicopter maneuvers, the Army Male carefully lays the phone cable directly into the centers of the erected telephone poles.



1 Phone pole being vertically lowered. Sikorski H-35A can be dropped easily into pre-dug holes dug previously for added assurance.



3 Spiral cable and is untangled inside the cockpit, ready to feed phone wire along the wire.



5 All the Signal Corps personnel have to do now is secure the cable to the pole's crossbar.

Four design ideas you can use right now...



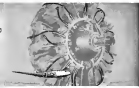
DEPENDABLE FUEL FEEDING Fuel for the 265 Turbojet engine is injected in the burner through Titeflex® flexible metal hose. Tough, light weight Titeflex—tested for temperatures from -20°F to +1500°F, and for pressures up to 200 psi—safely carries fuel to engine nozzles, withstands vibration and rough use, is ideal for complex configurations.



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CUSTOM WIRING SYSTEMS Titeflex specializes in designing and building special "packages" using systems and component assemblies the factory creates, selection and guided master installation. Here may be isolated with protective sleeve or other component—and Titeflex Special Connectors used as integral parts where complex wiring problems.



RADIO WINDING Titeflex hoses for reeling/unreeling engines in use specially Titeflex makes a wide range of standard option harnesses meeting high engine specifications—also able supply temporary parts, such as verifiable needs for utility and commercial aircraft. Titeflex applications on Wright R 1500 engine include harness and leads.

FROM DESIGN TO FINISHED PRODUCTS Titeflex is especially well qualified to help you with all problems of special metal hose, wiring and connections. Take advantage of the long experience of Titeflex engineers in developing high temperature fuel lines, in designing and fabricating harness and wiring systems. Write us now about your application, our nearest representative will be glad to call and help you. Or send for our new 66-page Metal Hose Catalog No. 306.

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Industry Gets Microstrip License Offer

• IT&T makes available new process of forming small, lightweight, low-cost microwave accessories.

By Philip Klier

The electronic components and equipment industry has reacted swiftly to an offer by International Telephone & Telegraph Corp. to license its new Microstrip process, a printed circuit technique for making extremely small, lightweight, low-cost waveguides and accessories for use in radar and microwave equipment (AVIATION WEEK Feb. 2, p. 46).

Some time a week after the license offer was made at a technical Microstrip symposium, more than half a dozen companies had opened negotiations with IT&T's Federal Telecommunications Lab., North, N. J., which developed the process.

Five of the companies are currently in the waveguide or printed circuit business. Two others are equipment manufacturers who want to subcontract the waveguide engineering portions of their new military developments to FTL for application of the Microstrip technology.

► **Licensing Offer.**—A licensed equipment representing 60 different electronic equipment components and accessories, should the new process for a technical license in Microstrip. Then, IT&T said it has 30 patents and applications pending on Microstrip. These, plus FTL know-how gained in three years of work, were offered to companies interested in securing a license agreement with ITT.

Microstrip is expected to have considerable appeal for use in aircraft and missiles, where its size, weight, and low cost offer advantages over other technologies. IT&T spokesmen tried to sell, however, that the technique has disadvantages for certain applications and they don't expect it to completely replace conventional microwave technology.

► **Construction Details.**—Microstrip performs the function of a conventional waveguide which serves to carry microwave energy from a radar antenna to the antenna, and from the antenna to



CONVENTIONAL WAVEGUIDE and microwave accessories are compared with Microstrip version, shown on demonstration board at IT&T's recent industry symposium.

the intermediate frequency stage of the receiver.

Conventional waveguide construction, consisting of rectangular thin-walled metal tubing, is aptly called "plumbing." It is comparatively difficult and costly to fabricate and hard to acquire information.

Microstrip substitutes its own type of waveguide, consisting of a thin copper conductor separated from a copper sheet (ground plane) by a thin dielectric. In this technique, waveguides and



BAWG MICROSTRIP consists of copper conductors separated from a copper ground plane by a thin dielectric (non-conductor). The unit is produced by a photo-etching process.

components, such as hybrid junctions and attenuators) are designed, as drawn to scale on a tracing cloth, photographed, and then produced by a photo-etching process similar to that used for conventional printed circuits.

As a result, FTL says its Microstrip waveguides and components can be produced for only "a few pennies" at the cost of conventional microwave plumbing.

► **Other Advantages.**—In addition to low cost, the companies listed E. F. Engelmann, head of FTL's Microstrip engineering group, list the following advantages:

- **Lightweight.** It has a 25-100:1 weight advantage over conventional plumbing. The weight saving advantage comes in operating frequency increases.
- **Consistent.** Its low mass results in a structure for aircraft and missiles use where equipment is subjected to very high g-loading.
- **More compact.** Its construction is more compact than conventional waveguide.
- **Lower cost.** The problem of finding low-cost copper conductors and dielectric keeps out expensive and characterizing



MICROWAVE RECEIVER constructed with conventional waveguide and tech tapes, look like this in . . .



MICROSTRIP version of same one.



PHOTO-ETCHING process is used to produce Microstrip. Here a photo negative of a group of hybrid junctions is being exposed for a master printing on a photo resistant copper plate.

ing in frequency problems associated with conventional waveguides.

► **Easy to work.** Open construction makes it easier to work, both in production and in the laboratory. In experimental design, a new look can be used in form of open waveguide conductors.

► **Quick fabrication.** The transition from experimental waveguide to production is speeded with Microstrip because the experimental waveguide need only be photoetched to provide a master pattern for production.

► **Design flexibility.** The transition from experimental waveguide to production is speeded with Microstrip because the experimental waveguide need only be photoetched to provide a master pattern for production.

► **Design flexibility.** The transition from experimental waveguide to production is speeded with Microstrip because the experimental waveguide need only be photoetched to provide a master pattern for production.

the problem. (Teflon Fluoro glass, with a dielectric constant of 2.00 at 1 mc, is presently used.)

Engelmann told the symposium audience that Microstrip performs a nearly comparable to Type RG-3/U coax cable. "If your equipment can use RG-3/U, it can use Microstrip," Engelmann said.

► **Consistency and Limitations.**—FTL has found that higher losses (per running foot) do not necessarily mean decreased equipment performance as many engineers, A. C. Clavin, FTL technical director, expected. Because it that Microstrip permits more compact equipment layout and construction, requiring less waveguide than when conventional plumbing is used.

Although the new technology can be used to form hybrid circuits, attenuators, local oscillator mixers, and crystal holders, they are not suited for high-Q (high-quality) mixers, both Clavin and Engelmann agreed. The technology includes such items as cavity resonators and filters where low losses are mandatory.

Microstrip has more limited power-handling capability than conventional plumbing. Engelmann reported that it can safely handle 500 watts CW (continuous wave) at a frequency of 10 kmc, but he noted that FTL has run Microstrip at 400 watts at that frequency. At lower frequencies, the CW power handling capabilities of the device are higher.

Most of FTL's work with Microstrip has been in the 10- to 100-kmc band, although it has been tested at least to 10 kmc.

► **Demonstrating Microstrip.**—Dynamic exhibits, designed to demonstrate the performance of Microstrip components, were placed around the symposium and forums and attended considerable in number. One, for example, had a Microstrip waveguide with ferrite attached to its ground plane. A small magnetic field, applied from an audio oscillator and placed on the waveguide, served to modulate the microwave energy from another signal generator which was passing through the waveguide.

FTL has also devised and plans to sell an "Enclosure" type of kit of standard Microstrip kits and accessories. These can be quickly assembled into a variety of microwave circuits for engineering, experimental, and simulation purposes. Price of the kit will be \$150,000, depending on its contents, a spokesman said.

Soldered sections, normally employed for production, are somewhat more difficult to assemble and are more difficult to work with than Microstrip. It is said to be impossible to damage from short circuit or overload and free from solder contamination. Outputs of 150 w to 25 kw, single or three-phase are available with water cooling, by George Deshpande, who developed them.

New Developments In Mag Amplifiers

New developments in magnetic amplifiers, which are finding increased use in atomic equipment, particularly serve systems, have been announced recently by three manufacturers. The companies and their products are:

► **Magnetic Research Corp.** has announced three different types of 400-cycle mag amplifiers. Model MA-15-80 delivers 2.5 watts, 115 v, and is designed for servo motors such as U. S. Navy Model Mk 16. Unit weighs 12 oz., will operate at an ambient temperature up to 105°C and has a frequency response of 0 to 15 cps. Company says Model MA-15-400 mag amplifier has similar specs but is rated for 15-watt output. Model MA-40-400 delivers 40 watts at 220 v, and is designed for 400 watts servo motors such as Edgerton CK3001. This model weighs 4 lb., can be operated at 70°C, and has a frequency response of 0 to 10 cps. Manufacture says it can be controlled by a DAFI (dynamic amplifier feedback) or a demodulator which gives input signal is used. Mag amplifier output is a unidirectional 400 cps phase-locked voltage. (Magnetic Research Corp., Dept. 1070, 315 Kew-Forest St., El Segundo, Calif.)

► **D. & R. Ltd.** has added a new line of microstrip 2,000 and 4,000 cps, magnetic amplifiers to its standard line of 40 and 400 cycle units. Model MA-40 has the same high-frequency line weights with their output and deliver 15 watts output with rapid response time and high power rms. Company says (D & R, Ltd., 400 E. Gettysburg St., Austin, Texas 78701).

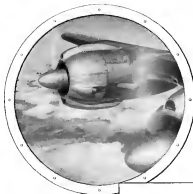
► **Magnetic Amplifiers, Inc.** have developed a new line of adjustable mag amplifiers for use in servo systems. Available characteristics can be varied to achieve zero loss for a wide range of performance requirements, load conditions and gain ratio concern says (Magnetic Amplifiers, Inc., 612 Tinton Ave., New York 15, N. Y.)

Low Maintenance for Frequency Converter

Quantum Corp. has introduced a compact motor-generator unit for converting 60 cycles to 600 cycles.

Featuring "no-lubric" construction, the unit boasts all long-life and durable parts with little or no maintenance necessary. It is said to be immune to damage from short circuit or overload and free from solder contamination.

Outputs of 150 w to 25 kw, single or three-phase are available with water cooling, by George Deshpande, who developed them.



TIME FLIES —do you?

Time is always flying.
You can save some of your
time by flying, too. Yes,
ride the airlines regularly.
You'll save moments,
minutes, days, weeks to use
as you choose—for business
or pleasure. Next time...
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New Devices for Electronic Labs

A study of electronic lab equipment ranging from pulse generators to power supplies, from oscilloscope oscillators to spectrum filters, has recently been announced.

Among the new devices:
• **Pulse Generator, Model PG 280A**, for generating rectangular waveforms with pulse widths adjustable between 0.05 to 50 microseconds, for up to 1,000 microseconds with an auxiliary read with rise and decay times of 0.05 microseconds or less, is available from Tele



tronics Laboratories, Inc. Pulse repetition rate can be varied from one to 10,000 pulses per second. Device can be operated self-sufficiently or driven by an external signal of almost any waveform, manufacturer says. Address: 55 Knoll St., Westbury, L. I., N. Y. (Type AW).

• **Oscilloscope Oscillator, Model 305**, designed to serve as a highly stable local oscillator over the frequency range of 2.50 to 2,550 mc., has been announced by Laboratory for Electronics, Inc. Stabilized oscillator loop, operating from a calibrated reference cavity, holds



long-term drift to less than 100 mc., company says. Twelve five percent modulation can be obtained when oscillator is stabilized, pulse modulation is possible by increasing stabilization. Output power is 35 mw. Address: 73 Pitt St., Boston 14, Mass.

• **Large Screen Oscilloscope, Model 21A**, equipped with a 21-inch rectangle flat-plate tube to permit using electronic lab measurements for demonstration purposes, is now available from Teknomatic Instrument Co. Stable deflection amplifiers and power supply make it possible to calibrate gain controls for accurate voltage measure-



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► **New Radio Display Tube-Airline**—Look for a high intensity cathode ray tube suitable for use in airborne surveillance radar set by Avco Radio Corp. of America's aircraft lab has developed a new straight type CRT which has less by five counts as well as half-time (double) refreshment. Built-in tubes are desirable for weather radar display.

► **Bell Incorporated Antelope-Bell** Aircraft Co. has developed a new looking an automatic pilot for use as a 100-1 inch sub-sonic, the company says. Device is intended to aid pilots in low-altitude capabilities.

► **Aviation Literature**—Recently announced publications of interest to persons in the aviation field include the following:
• **Packaged plug-in connectors**, available in a new type of construction which permits disassembly for repair to individual components, is described in a 12-page brochure available from U. G. Connectors of Electronic Engineering Co. of Calif. Brochure details 20 all-the-shelf plug-in connectors and 25 types available on special order, between 100 S. Alameda St., Los Angeles 17, Calif.

• **Electronic control transmitters**, point-to-point types, are described including parameters and operating data in Bulletin No. GL-5 112 available from Texas Instruments Inc., 6500 Lechman Ave., Dallas 9, Tex.

• **Handbook**, Model AV-10, designed to measure frequencies of 5 to 100,000, at frequencies of 5 to 100,000, at temperatures up to 100°C, is described in Bulletin by Colson Mfg. Corp., (Incorporated) Virginia 2, or mail one a pre-addressed coupon (form 999) Company address at Milwaukee, W. J.

• **Atomic transmitters**, ranging from low wattage transmitters to high wattage transmitters, are described in a 20-page booklet, GEA 1971, showing General Electric line of atomic transmitters. Booklet also describes alternative fuel pumps and new air turbine engines. Copies are available from GEA Corporation, 300 Delaware, Schenectady 5, N. Y.

NEW AVIATION PRODUCTS

Actuators Redesigned For High Temperatures

Boeing Aircraft Corp.'s Pacific Division announces redesign of the Gencon Loc electric actuators to fit them for high-temperature use. The company states that both the LM 108 and LM 118 series now operate under full load at temperatures in excess of 200°F. Actuators and like assemblies are designed for temperatures over 200°F.

With proper consideration for radials, vibration and other factors, wire data can be used around 500-600°F, the manufacturer says.

There are positive mechanical positioning actuators. Can movement as complete positioning wheel radius data the work. Special shunting control and new bearings have been incorporated into the new design.

Boeing Aircraft Corp., Pacific Division, 11600 Sherman Way, North Hollywood, Calif.

Fire Control Equipment Plugs Into Potentiometer

Franklin Camera and Instrument Corp. announces redesign of its type 716 potentiometer to incorporate a "plug-in" feature for aircraft fire control equipment.

Only one knob for fast access to the zero, 27-1/2" potentiometer and easy wiring. There are no wires to cut.



Franklin Camera and Instrument Corp., 12316 W. Pico Blvd., Los Angeles 64, Calif.

Northrop Awards License For Leakproof Fitting

Probes Machine Co. has received an exclusive license from Northrop Aircraft, Inc., to manufacture and market a Northrop-developed leak-proof, leak-resistant, in-situ leak fitting for jet aircraft fuel systems, designed for use in the F-105 Scorpion all-weather interceptors.

Northrop uses the unit is capable of withstanding lower shock loads by high pressure. The unit, which weighs about 360 gms, is used by Probes Manufacturing Co., 9310 Alhambra Ave., Los Angeles 32.

Tolerances include a consistency of

shift to pilot loading of 0.001 in. FTR, maximum, total shift play of 0.0009 in. maximum, pilot loading diameter of 0.5 in. (+0.0005 in.) 500-600 psi shift in customer's ground to a diameter of 0.25 in. (+0.0005, 0.001 in.). Shift may extend both ends of plug with standard form of 0.775 in. (+0.001 in.). Operating airway at leak rate: range is 100 to 170°C. Standard Camera and Instrument Corp., 225 Park Ave., Hicksville, L. I., N. Y.

ADF Turret Control Unit Permits Remote Mounting

A small, compact remote ADF (Automatic Direction Finder) turret control, measuring 4 1/2 by 4 1/2 by 4 1/2 in., is being offered by Lenz, Inc.'s Lenz-Cal division to go with the turret unit of the company's standard ADF-14 electronic direction finder.



The frequency selector covers three bands: 115-800 kc., 775-1,050 kc., and 1,050-1,710 kc., and features through a flexible cable. The unit has an illuminated shifter-type dial. It also has remote tuning control, a volume control, frequency selector switch, CW switch and tuning meter. It is designed for simplicity in layout and use.

Lenz-Cal notes that unit will be available only as part of complete ADF-14 system for the present.

Lenz, Inc., Lenz-Cal Div., 12316 W. Pico Blvd., Los Angeles 64, Calif.



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To protect its new fleet of million-dollar Douglas DC-6Bs, Western has specified that all of them will carry fire-resistant Monsanto Skydrol® in the cabin superchargers. These new planes are for service on the Pacific Coast, and between California and Minnesota.

Western is the 15th major airline to adopt this safe, non-toxic hydraulic fluid which is unique in its field. Here's a digest of Skydrol's outstanding performance features:

May 17, 1958, Page 12



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Skydrol is the only fire-resistant fluid

which can be used in both cabin supercharger and hydraulic systems, as well as also waste. Ask for information on Monsanto's Federal J-5, the resistant fluid for hydraulically operated industrial equipment.

SKYDROL, containing complete technical specifications and test data, will be sent to airline officials or aircraft owners on request. Write: MONSANTO CHEMICAL COMPANY, Organic Chemicals Division, 808 North Third St., St. Louis 1, Missouri.



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T-6 Advanced Trainer—Used by 33 Army Air Corps in W. W. II. Provided close tactical ground support in Korea.



B-25 Mitchell Bomber—Served in all theaters in W. W. II in several different bombing capacities, including famous first bombing of Japan. Rugged, practical, heavily armed.



P-51 Mustang—Leading fighter of W. W. II. Served as photo recon, close bomber, scout, smart speeder, for close ground support. Held line in Korea before Sukarno arrived.



B-45 Tornado—First operational multi-engine bomber to fly in the U. S. First to fly non-stop across the Pacific.



T-28 Trainer—Faster than any W. W. II fighter with top speed of 306 MPH. 1,600 already delivered to Air Force. Now being delivered to Navy.



F-86 Sabre Jet—Serves striking force of NATO. Produced in America and Canada and in Italy for NATO. Achieved its best all-around fighter in the world.



F-46D Sabre Jet—America's only all-weather, all-weather intercept fighter. Now operating in primary operational defense, with 501 MPH plus speed.



F3-3 Fury Jet—Latest of North American's F2 Series of Navy carrier-based fighters. With faster speed and rate of climb than previous fighters.



F-100 Super Sabre—The most performance efficient in all weapons effectiveness. Now in production for Air Force. Faster than speed of sound in level flight.

NORTH AMERICAN HAS BUILT MORE AIRPLANES THAN ANY OTHER COMPANY IN THE WORLD

New Charts Simplify Highspeed Navigation

- **Coast & Geodetic strips clutter from air maps.**
- **Simpler, safer series stresses major hazards.**

By Lee Moore

A new line of experimental charts designed to simplify highspeed jet and transport navigation, as well as high-speed visual flying, will be introduced by Coast & Geodetic Survey this winter and next spring.

The experimental charts are extensive simplifications of the conventional route, radio facility, approach and landing, and standard aeronautical chart series.

Here are the objectives for trial and later public sale of the first new chart series:

- **Jet charts for highspeed navigation** will eliminate everything except on many long flights and eliminate unnecessary details. Few charts covering the entire U. S. will be issued each year. By June, experimental strip maps, each covering no more than 100 miles, will be used by civil and military operators.
- **Radio facility charts** used for enroute navigation will be changed and reduced from 172 separate charts to from 14 to 15 larger folio charts.
- **Section of maps to experimental version** is "Brevity," says Coast Survey's McCarty, chief of the Survey's aeronautical chart branch. They probably will be issued only next year, depending upon final results of the current investigation.

- **Aeronautical charts used by all pilots will be simplified.** They will eliminate much detailed instrument information and clutter and emphasize physical hazards such as obstructions, terrain. Trial reductions alone will cut clutter, further pictorial shading of mountains also may be tried.
- **Approach and landing charts** for about 50 airports in hazardous terrain will emphasize contour with pictorial shading. Hazardous terrain will be slow by means of design and production problems. Only three have been issued to date.

- **Present complete series of about 1,000 individual approach charts** would increase to 1,200 at the current rate. It may be cut to about 400 to 500 by using only one chart per airport instead of one per individual instrument approach to each airport.

Present complete series of about 1,000 individual approach charts would increase to 1,200 at the current rate. It may be cut to about 400 to 500 by using only one chart per airport instead of one per individual instrument approach to each airport.

However, Coast McCarty says that whenever some detail has been removed, it has been replaced by one condensed



EXPERIMENTAL strip maps are designed for jet flight, each covering no more than 100 miles.

approach to each airport. Trial introduction of this series is January.

- **Simpler, safer**—Early next month, Coast & Geodetic will make a final in one of its New York sectional aeronautical charts of the type generally used for visual flight navigation.
- **Coast McCarty says** that chart must become easier and more complicated by presentation of both high-frequency and low-frequency navigation and to navigation.

The plan now is to strip it back to the major navigational features, give more stress to major hazards and landmarks, cut the instrument information to a minimum, and remove clutter. Changes include:

- **Shaded stage legs.**
- **Remove runway borders,** leaving only a light line to indicate runway.
- **Darken contour areas,** calling more attention to positive terrain contour.
- **Decrease TV tower range** from 500 ft. high by use of bold, solid triangle to indicate them.
- **Mark more major airports** with bold shading instead of actual runway pattern as before.
- **Drop radio frequencies** other than the basic one which is used at each facility.

Since highspeed jets relying upon detailed visual checkpoints complicated, as Coast & Geodetic experimental charts details from the standard charts.

However, Coast McCarty says that whenever some detail has been removed, it has been replaced by one condensed

must careful. He says the government relies upon pilots' cooperation in reporting important new features such as unknown major terrain and grain elevators for addition to these charts.

McCarty notes up the problem: "The trouble is that we continue to get better planes and new navigational aids but we never get out of the old ones, complicating the mapping job."

• **Jet Navigation—Aircraft speeds increase,** Coast & Geodetic maps simpler, better maps to supplement the standard "world aeronautical charts" series used for medium-speed, long-range navigation.

From 1947 to 1950, a route chart series of some maps evolved. A series series of four U. S. maps charts plus several specialized route charts is being developed for 1954 navigation. These route charts previously were hard to detail, but sufficient and well-known called and will get more terrain and radio information. Some of the maps called maps will be designed to aid radio navigation.

Release of this series means agreement between military and civil users on certain requirements.

The progress of chart design for automatic DME-VOR pictorial computer has been checked pending with revised system of the DME electronic display (Aeronautics Week Nov. 28, p. 18).

• **Approach & Landing—As with the RF series, the number of separate approach and landing charts has been**

cost nearly twice as much (about \$14,000 for the U.S.). Coast & Geodetic hopes to be able to cut this number by two-thirds by showing all approaches to each airport on a single chart.

The progress of lightplane navigation from by mechanical plotting to projecting slowly because it is done by photographing plane models. Recently, a national demonstration of automatic plotting depends upon how they are illuminated during the actual photographing.

A problem with two-color presentation, used on approach and landing charts is that if the chart is looked at upside down, shaded mountain slopes appear as if to "unrise" and appear as valleys, due to optical illusion. Coast & Geodetic is experimenting with lighting techniques to help eliminate this problem.

CPA Loses Fight For Air Cargo Route

Toronto-Canada has rejected Coast Pacific Airlines bid for airfreight routes from Montreal and Toronto to Vancouver, a decision that confirmed an air cargo monopoly held by government-owned Trans Canada Air Lines.

The Canadian Air Transport Board turned the case over to the Cabinet for decision earlier this year, because it involved "a major change in policy." The Cabinet decided that transcontinental air cargo competition at the present time would involve overly depletion of services, "leading to a heavier burden on eastern shippers and taxpayers alike."



New Runway Centerline Markings

To provide adequate visual guidance during low-visibility approaches, the centerline project of 79 ft. diamonds supplemented with bold threshold markings, side-line edge stripes and illuminated distance markers has

Fight for Title

- North American Airlines battles to keep its name.
- Nonskied planning future expansion, eyes DC-7s.

A spokesman for North American Airlines, the country's largest unscheduled operator, says "ultimately" a Civil Aeronautics Board order that the company change its name. The airline says it is going ahead with plans for the future, including discussion of buying DC-7s.

The carrier plans a court appeal from CAB's order (Aviation Week Nov. 16, p. 15) that it drop "American" from its name to prevent further confusion with American Airlines. Meanwhile, the company says local focus on the daily New York-Washington coach flights in which it participates only such service between the points as a coach flight between Washington and the largest in the business, running around 57%.

DC-7 interest-North American's plans for the DC-7s are not flat, but it has a definite interest and feels the general Douglas transport "probably will be the next order."

Presumably then, like two DC-6Bs it is to acquire next year, would be equipped with inward-facing seats.

Plans of the six DC-7s the line expects have been converted to twin seating, and passenger seating capacity

ally is good. All of North American's planes are to have matching seats eventually. No other airlines' seats, says the company, are even there.

The DC-6s have been scheduled for delivery late next year, but the carrier hopes saving of military requirements will permit them to be made by the beginning of next summer.

Daily Coast-North American started the New York-Washington quadrunner flight last summer in a split of its route from the East to Dallas, Los Angeles and San Francisco.

The service started with a frequency of four days a week, increased to five, and now operates seven. Flights between the two points is 516 one way, 519 round-trip. Coast-North American fares on the scheduled carrier are \$16.95 and \$31.51.

One explanation of the high load factor, in addition to the out-of-the-way route, may be the fact that no scheduled airline has New York-Washington coach service, although American, for instance, has been known to put a full-price, standby passenger between the two cities on a coach flight between Washington and a larger coach route.

Boeing North-Born American and Eastern Air Lines have asked CAB permission to operate their suspended Boston New York-Washington coach operations, and North American, which already has a ticket office in Boston, is working to see what they will do before making plans to serve that city.

Frequency Question-CAB has indicated the feasibility of the scheduled flight. But North American, as one of the four operators under the overall ticketing system, North American Aircraft Service, Inc., explains that this was

The carrier and its three operating affiliates—Trans American Airways, Hemisphere Air Transport and Trans National Airlines—were limited under this arrangement to CAB restrictions to 15 flights a week, between two given points. On the New York-Washington operation, the four airlines split out the month with 15 flights apiece.

In addition to the Southwest routes at which the New York-Washington flights are put, the carrier operates transcontinentally from New York through Chicago and Kansas City to the West Coast, between New York and Mexico, and a shuttle between San Diego, Los Angeles and San Francisco.

Correction

AVIATION WEEK has been indicated that the 2,000 cubic yard ship built by Easton Air Lines pulled because of electrode breakage, and announced in the Oct. 25 edition (p. 64), were not manufactured by AC Sparkplug, as stated in the article.

Bankrupt Cargo Line Asks for Stock Sale

U.S. Airlines, Inc., has asked Securities & Exchange Commission for permission to sell 95,515 eventful per value shares of common stock for a total price of \$90,000 to keep the cargo line operating at least until Dec. 15.

The company is under involuntary bankruptcy proceedings filed Sept. 17 in U.S. District Court for the Southern District of Florida, Miami Division.

Govt Control—The court authorized the sale of 27 to creditors and 68 to the company, provided it could deposit a specified cash of \$40,000 within 30 days. U.S. had a debt of \$613,816 Dec. 1.

All money accumulated as to be the company's assets and all money will be deposited in a separate account while the airline is under the control of the bankruptcy court.

Route to State—No action to financial difficulties, U.S. Airlines has been discussed by Civil Aeronautics Board to show them why its certificate of necessity and convenience should not be revoked for its longer coach routes. A hearing has not been set.

The airline has been authorized to operate 35 cities. Flight routes between Minneapolis and Boston south to New Orleans and Miami, with routes connecting at Atlanta, Ga.

Since June 18, 1952, the company now flows military personnel under a CAB temporary exemption order that expires Dec. 31.

Leased Aircraft—The airline also is in difficulty over its aircraft, all C-46s leased from United's Air Material Command. For years, asked the Miami District Court for the return of the C-46s after the carrier became involved in bankruptcy proceedings.

Most of the aircraft has been returned to USAF, because the airline hopes to have its lease revived. The court has not yet made a decision.

Of the stock to be offered for sale, 52,000 shares have been committed by Chevrolet & Co., Inc., of St. Louis, 15,000, William D. McCoy, 100,000, Paul D. Shively & Co., 50,000, Henry Hirschman, Jr., 10,000, Republic Industrial Corp., 100,000, Nelson Kohn, 100,000, Everett Faria, 20,000, Robert Schiff, 20,000, and [w] W. Kinschere & Co., 120,000. The remaining 205,851 shares will be sold on a "best efforts" basis at the market by the underwriter.

Change in Command—Since September, U.S. has had a change in command with the resignation of its president, a vice president and treasurer. Fred A. Miller resigned as president and director of the company, as did E. G. Giffagher, quit as vice president and treasurer.

John W. Hatchinson, former Glenn L. Martin and Northwest Airlines executive and assistant deputy director of Assistant Production Authority, Aircraft Division, has been named president at a salary of \$11,000 per month.

Robert J. Chelset, has succeeded Giffagher as vice president and treasurer. He is associated with General Electric, the airline underwriter. His salary has not been fixed, but it will not exceed \$400 per month, the airline reports.

No successor has yet been named to Carl G. Gordon Moore, who resigned as vice president and director.

Operating Losses—The airline admits its record has been one of increasing losses since 1948, when it began operations. Dec. 31, 1952, the company reported a loss of \$594,099. By May 31, 1953, the net loss was reported as \$347,752.

U.S. is undergoing its third bankruptcy proceeding. Financial difficulties sent the company into bankruptcy in June 1951. The firm was reorganized in October of that year, and a reorganization program pulled the airline out of the red. Involuntary liquidation was filed against the carrier in October 1952 by its creditors. This was settled when creditors received their payment.

ALPA Protests Cat In Weather Ships

The Air Line Pilots Assn. has written to Secretary of Commerce Clegg Weeks protesting the U.S. govern-

ment's decision to withdraw its support of the North Atlantic weather ship program (Aviation Week Nov. 2, p. 15).

ALPA president C. N. Sipes says the association's primary objection is that the decision was reached with out consulting pilots and with no viable effort to find substitutes for the service.

"The men who conduct flights over the North Atlantic waters," he says, "have day-to-day knowledge and experience in the necessity for such services not available to any other group in government. We believe we are entitled to be consulted prior to decisions being rendered which affect the facilities available to us to fulfill our responsibilities."

Government Reply—Commerce Department and Coast Guard replied that the withdrawal plan was studied thoroughly by Air Coordinating Committee representatives at all interested government agencies. They found that an agency had a "responsibility" for the ships, and that the U.S. no longer can afford such weather station services as a commercial.

ACC has checked with the Air Transport Assn. and the individual airlines flying the Atlantic. All confirmed that there was an actual "need" for the ships. U.S. officials said.

The Weather Bureau plans to substitute a new daily reporting system from ships and aircraft at sea. A search-and-rescue program utilizing most of the weather facilities also is being prepared.



Conveyers for Airport Travel

Airline's conception of a design by Good year Tire & Rubber Co. for conveyer belts to be used at airports for moving passengers and luggage to and from planes.

Speedwalk system incorporates moving stream and belts for luggage, both moving at the same speed so that passengers can transfer safely from one to the other.

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Airlines Winning State Support

CAB member Adams starts promotion program by warning officials to aid local carriers or lose them.

State aeronautics and aviation officials are showing signs of protecting their incipiently-embodied local service air carrier in response to a nationwide challenge by Civil Aeronautics Board member Joseph Adams.

State officials came to Washington to plead with CAB for more federal-supported local service. Adams told the National Association of State Aeronautics Officials, and they do little to make the service survive.

Notorious include:

- **Albuquerque Airlines** president Leslie O. Barnes: "A most significant milestone in our nation's development as a most sensitive, but non-existent, point of responsibility. Leadership on the question of federal state-encouraged responsibilities in the development of local service necessarily had to come from the CAB."

"With the greatest sincerity, I congratulate you on again assuming the leadership in the development and maintenance of a basic point of policy. Follow-up depends to a large extent upon the local airlines and on the state organizations."

- **Clark Air Lines** president Laddie Elbertson and his airline would work with local communities and airports, and stated:

"Your message was a very constructive one in informing the State Aeronautics Officials a tangible program of support new to the local service carriers at this important time. We have already received a letter from Mr. Lee Kasten, chief of the aviation section in Missouri, offering to assist us in the ways outlined in your address."

- **Central Airlines** president Earl Kilde said: "Your speech should help us in getting over the point that the state has a responsibility in promoting traffic to the state in the local service airline." He added that Central's "competition out here in the private automobile and the bus and the airline began to represent some with relatively few lines to obtain state traffic."

- **Frederick Airlines** president F. H. Davis wrote: "We tell you what a great service I think you have rendered to our industry."

- **West Coast Airlines** president Nick Bevilacqua said: "I have witnessed our people to follow up on this so that the spirit did effort you displayed would not be lost, and I am sure some good will come from it."

- **Air Transport** Assoc. general counsel Short Eptima wrote: "Since Everett, Ed Rogers and I agreed that it was an

excellent presentation and thought that you would probably not appear as an being presentation if we told you so."

- **American Airlines** vice president Milt Carlson Roberts told the Adams critique "a helpful guide toward progress in the local airline field."

Conrad Howard Whitworth and that "it is one of the most stimulating dimensions of this subject I have read in a long time."

Adams' remarks to the CAB were preceded by a letter from the CAB's director Edward Knapp and that Adams' presentation "was one of the most stimulating and challenging that has been delivered by a Board member. It establishes a delicate relationship and policy in the area of local airline service between state aeronautics agencies and the Board in setting forth responsibility for success of the service."

President Knapp said that Adams' presentation pointed the Adams challenge but asserted that *Prattville* already has been doing much work to promote local service airline growth.

Adams recommended there is the airport positive program that Adams recommended to the state aeronautics officials at their annual meeting.

- **El Paso** got things started, "state aeronautics officials should call on the (airline) management concerned to send their officials to the office of the (airline) director for a good indoctrination seminar."

"Please a carefully argue and position report of the local service airline street view communities and passed from there." Then, Adams recommended, you chambers of commerce and other civic groups in a "service to the people" type of campaign, in those which the survey reveals to be producing less than 150 passengers a month.

- **The state** agency officials "should explain through their publications, radio and TV programs the type of service that the local carrier is rendering and that the maintenance of local service is dependent upon full acceptance and support by the community." The state should "point up the fact that federal subsidy involved in local airline operation is a subsidy to the community, not the carrier."

- **Endorse and encourage** use of local service by all state agencies for official travel.
- **Start "air educational tour"** Adams says that one state director promoted local airline tour last year "that served 2,504 people, mostly boys and girls under 15 years of age as part of this program."

- **Boost revenues, cut costs** by the airline by encouraging airport management to switch their fuel collection from a franchise to a government-owned base. This way, the airport and the airline work together toward increasing revenues, and the airline is not faced by fuel charges that, however, it may not be able to afford.

- **The Problem-CAB** members and the Commerce Department this year have become increasingly stressed at the mounting bloody costs of the local Adams, as a former (Working) two state aviation director, had pondered the problem and gathered airline and state information throughout the summer of 1955 before delivering his challenging program to the NASAO.

SHORTLINES

- **Air France's** new aircraft "Cordoba" Parisian Space Configuration flight leaves from London to Madrid as part of the new, following heavy flight's inauguration Nov. 26. The special flight carries 32 passengers at an extra cost of \$15 plus \$15 for "Sky-Room" accommodations.

- **British Overseas Airways Corp.** as

plans to introduce the Comet 2 on its London-Bos de Janeiro route next June. RCAF has applied for permission to operate a one-weekly full-day service, Manchester, England, to New York.

- **Canadian Pacific Airlines** expects delivery next fall of three Comet 2s for use on its intercontinental routes from Vancouver to the South Pacific and South America (Aeronautics Week Aug. 7, p. 84). Cost of the jet transport will be \$4.5 million.

- **North Coast Airlines** carried 33,401 passengers of U. S. annual during October, a new record for NCA. Previous high was 33,555 in October 1952.

- **Northwest Orient Airlines** expects it could save airfares to Anchorage, Alaska, from Seattle in the 11 months ended Nov. 11 thru it did for the whole year of 1952. Through October, a 40% saving 12% ahead of the most period in 1952 for total savings. It is to Alaska. NWA hopes reduced fares will lead to an increase in service between the U. S. and the Orient Nov. 15.

- **Pan American World Airways** has returned one of its 16 C-54s leased from the Air Force in 1949. The other 16 will be returned shortly in PAA's replacement of C-54s with DC-6Bs.

- **Philippine Air Lines** will increase the number of passengers carried between Manila and Rome to 25 each a week, a new agreement approved by IATA. PAA serves these cities on its route between London and Manila.

- **Port of Oakland (Calif.)** reports the Institute of Transportation and Traffic Engineering of the University of California is conducting a study of the possibility of new economic gains of airport expansion as a result of tests which were conducted recently at Oakland Municipal Airport.

CAB ORDERS

GRANTED:

Revolving fund for domestic mail rate of 15 cent a mile, with school. Southwest & Western Airlines companies to make a passenger flight from Reno, N.Y. to New York under contract with the International Committee for Emergency Migration.

Texas-Texas Airlines authorization to use and serve at Beatty, Nev., airport facilities are proposed. Alaska Airlines pilots permission to operate in the State Alaska state rate. New Orleans and its chamber of commerce permission to increase its mail

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Action Wanted

I have read your article entitled "NRAA Is Silent on Floor Noise," in *Aviation Week*, as published in the Nov. 4 *Aviation Week*. You quoted an article in "These are other organizations besides NRAA and since I have been working construction issues phoned him, I am going to them."

I take exception to this quotation and would like to correct you to this extent: I indicated at the meeting that silent issues being so close to self-insulation that because being made ready in the way of equipment, I would do everything possible to turn another group outside NRAA, with the express purpose of telling the aircraft manufacturers the words of expression being.

NRAA has done a fine job representing business flying in Washington and I think that the support we give them is well worth while. But I also feel that they are falling behind in the home representation of flying in the production of new aircraft. The words are that I feel that business flying will decline in the past that no representation in Washington will be made.

Anything you can do to help me on the formation of a group of well-qualified people on business flying to study the needs of the business aircraft operator, either in or out side NRAA, will be greatly appreciated.

I would like to add that they mean. The representatives I give for a business aircraft are as follows:

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8. Nashville, TN.

[The airplane is not out in length during flying—L.S.]

Silvaire's Odyssey

On page 55 of the Oct. 12 issue of your outstanding publication, you carried an advertisement for Continental Motors Corp. detailing the role of Fritz Glockensheim from Children in London, England and prison in a Lorraine bomber equipped with a Continental engine. The advertisement most points out that Mr. Glockensheim tried to help him continue in engineering the plane for the remanufacturing flight.

I am sure that statement was not correct. Let Mr. Glockensheim be contacted correspondents with Mr. Monte Mueller, our Chief Engineer, who reported Mr. Glockensheim with engineering drawings, data, suggestions, and actual equipment for the flight.

As you know, Lancaster Airplane Corp., which built Mr. Glockensheim's plane, is now a part of Taurus Aircraft Corp. And although we are an engine producer the aircraft we are greatly proud of our performance and at Mr. Glockensheim's doing accomplishment. In fact, we have been in

contact with Mr. Glockensheim since his return and are working with him on another accomplishment flight which he told us he is planning.

We would surely like to plan with Continental Motors Corp. in solving Mr. Glockensheim's accomplishment.

John C. Gaudin,
Public Relations, General Plant
Taurus Aircraft Corp.
Cleveland, Ohio

Who Helps Engineers?

I am a jet pilot in the Air Force and an active reader of *Aviation Week*. I will soon be retired from active and intend to return to college and finish my education in engineering (two years).

In your magazine I noticed the demand for engineers by the large aircraft and wondered if any of those who would aid me to help students obtain degrees and possibly work for three years but as a consequence of their previous experience can be used.

Although none of the facts advanced here should be assumed, I thought you might know of the companies that do have such schools.

Charles A. Nussmeier, Jr., Lt., USAF
McClure Training Group
Box 152, Tyndall AFB, Fla.

Crowding Airports

Be sure your area in *Aviation Week* Section 25, entitled "Jet Crowded Airports: New Needs Identified," Galt, Douglas's statement seems highly pertinent to me. Some to me that Lufthansa, at which operates the airport, would be greatly interested in packing the airports with space saving. This community is a statement in this city, not airport.

If the airport were first, it seems to me the people who then moved in would find it hard to find coming, and one must not agree if they don't like it.

David A. Strouss
10 Yale Square
Boston, Pa.

Redbird's History

The official mail magazine of the AF Association Center have thoughtfully accepted under your name of Aug. 15 as the Air Redbird's Development. Casualties, particularly those persons which concern our own work and efforts of interest. I feel, however, that there has been no change in the story of the development of a suitable airborne target.

The modification of the A-1 plane target to the "Redbird" configuration was a result of the personal efforts of P. A. Miller, a civilian employee in the Fuel Control Branch of the Directorate of Test Operations.

It was Mr. Miller who conceived the idea of modification of the standard target. He

personally designed the standard target required by the change in configuration, and working in his spare time, modified the first target. He was in charge of the flight and program which was initiated to evaluate the Redbird, and flew some 40 missions with them to prove the modification.

The entire Association Center, and particularly the Fuel Control Branch, is so heavily owed to Mr. Miller and to Redbird. We feel that recognition for the excellent piece of work should definitely be his.

WARD E. FREEMAN, Capt., USAF
Fuel Control Branch, AFMC
Wright AFB, Ohio

Sabre Fighter-Bomber

A. W. Joseph's article, "F-105 Is Top Fighter-Bomber," in the Oct. 19 *Aviation Week*, is a greatly interesting but leaves a misleading impression.

The article states that the 10th Fighter-Bomber Group was the only unit of its kind to "just the Sabre through its fighter-bomber group" during the first weeks of the Korean War. While the 10th was the first unit to be equipped with the F-105 in the Korean Theater, it was the 5th Fighter-Bomber Group under the command of Col. Walter C. Kern, Jr. which performed the first fighter-bomber mission with the new aircraft, in March 1951.

As a matter of record the 10th Fighter-Bomber Group conducted few active sorties from any other way as Korea with both the F-105 and the F-100, adding up a total of over 60,000 sorties in the Korean War and performing not only the development of fighter-bomber tactics with the F-105, but also with the F-100.

A great deal of credit should go to the officers and men of the 10th for their part in proving out the tactical difficulties on combat with the F-105, and for performing the mission to test aircraft from the F-105 without taking combat operations, a fact which the 10th was unable to match.

Forrest H. Winters
Lt. Lt., USAF
Dept. of Air Science and Tactics
Division of Flight School
Tyndall, Fla.

Praise

We at Aircraft Corp. and pleased with the article, General Christian wrote on our *Aviation Week* (Aviation Week Oct. 5, p. 64). You are to be commended for your accurate reporting and interesting presentation of the facts.

You would be surprised how many inquiries we have had from all over the country from DOD's operators who read the article and want to keep up performance of this plane. We are planning to send reprints of this article to our complete representative mailing list.

Doris Davis, Jr., Sales
Aircraft Corp.
Milford, N. J.

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Here is visible proof of HUFFORD-CURVE low economy! Each of the stretch-wrap forming dies moulds a new aircraft under. The end square inside the dies upon which sheets are formed directly in the ST condition! Used the development of HUFFORD-CURVE, just what short parts were stretch-formed in the 50 or 55W condition, with necessary reinforcement and heat-treatment.

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IN-FLIGHT REFUELING enables the B-47 to fly more than 12,000 miles non-stop. A vital factor in establishing rendezvous points is fuel consumption rate, measured on the B-47 by the G-E mass flowmeter.

Radically New G-E Fuel Flowmeter Gives True Mass Readings in Pounds per Hour

Jet engine fuel consumption can now be measured accurately at all operational altitudes and temperatures. A new kind of flowmeter, developed by General Electric, gives direct pounds-per-hour readings that are accurate regardless of density variations.

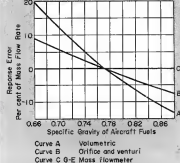
By measuring the mass of fuel consumed this revolutionary flowmeter averts the error factor inherent in earlier systems. It is the first true mass flowmeter in large-scale production.

In use on the B-47 Stratojet, the G-E mass flowmeter is proving its value as a cruise control instrument. The unusually long-range missions flown by the B-47 require utmost dependability in the indication of fuel consumption rate. The mass flow-

meter also assures precise setting of fuel flow in starting engines, thereby helping to prevent overheating.

A complete mass flowmeter system has three lightweight components—indicator, transmitter, and a shock-mounted power supply. One power unit can supply as many as eight transmitters. Pressure drop in the transmitter is very slight, making possible two important advantages: (1) no additional fuel pumping capacity is needed; (2) the transmitter can be mounted in the low-pressure section of the fuel line near the fuselage.

For more information, ask your G-E Aviation Specialist for Bulletin GEC-932. Or write to Section 210-82, General Electric Company, Schenectady 5, New York.



1. FUNDAMENTAL RESPONSE errors of the other two main types of flowmeter are contrasted with accurate response of G-E mass flowmeter.



2. INDICATOR has easy-to-read expanded scale that shows rate of fuel consumption in pounds per hour. Maximum weight: 0.6 lb.



3. TRANSMITTER gives readings up to 12,000 pph of mass flow. It will withstand 200 psi pressure. Maximum weight: 5.5 lb.



4. POWER SUPPLY has a 28-v constant-speed motor. Filters keep radio noises within Spec. MIL-I-6181. Maximum weight: 5.0 lb.

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